THE PAPER INDUSTRY

A MONTHLY EDUCATIONAL JOURNAL SEPTEMBER, 1932

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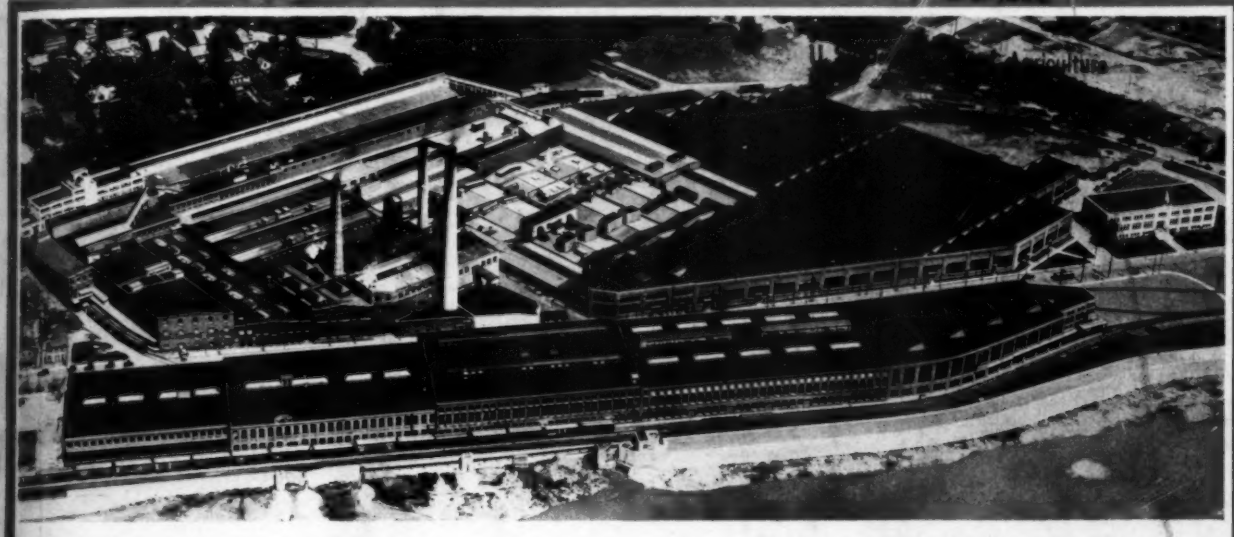

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Beaters . . . Jordans-Agitators . . . Fourdrinier Breast, Table, Guide Stretch, Couch, Press, Felt, Spring and Dryer Rolls . . . Machine Calenders, Reels, Slitters and Winders . . . Pebble Mills . . . Color Wagons . . . Coaters . . . Supercalenders . . . Brushing Machines . . . Cutters . . . Fans . . . Blowers . . . and Numerous Others

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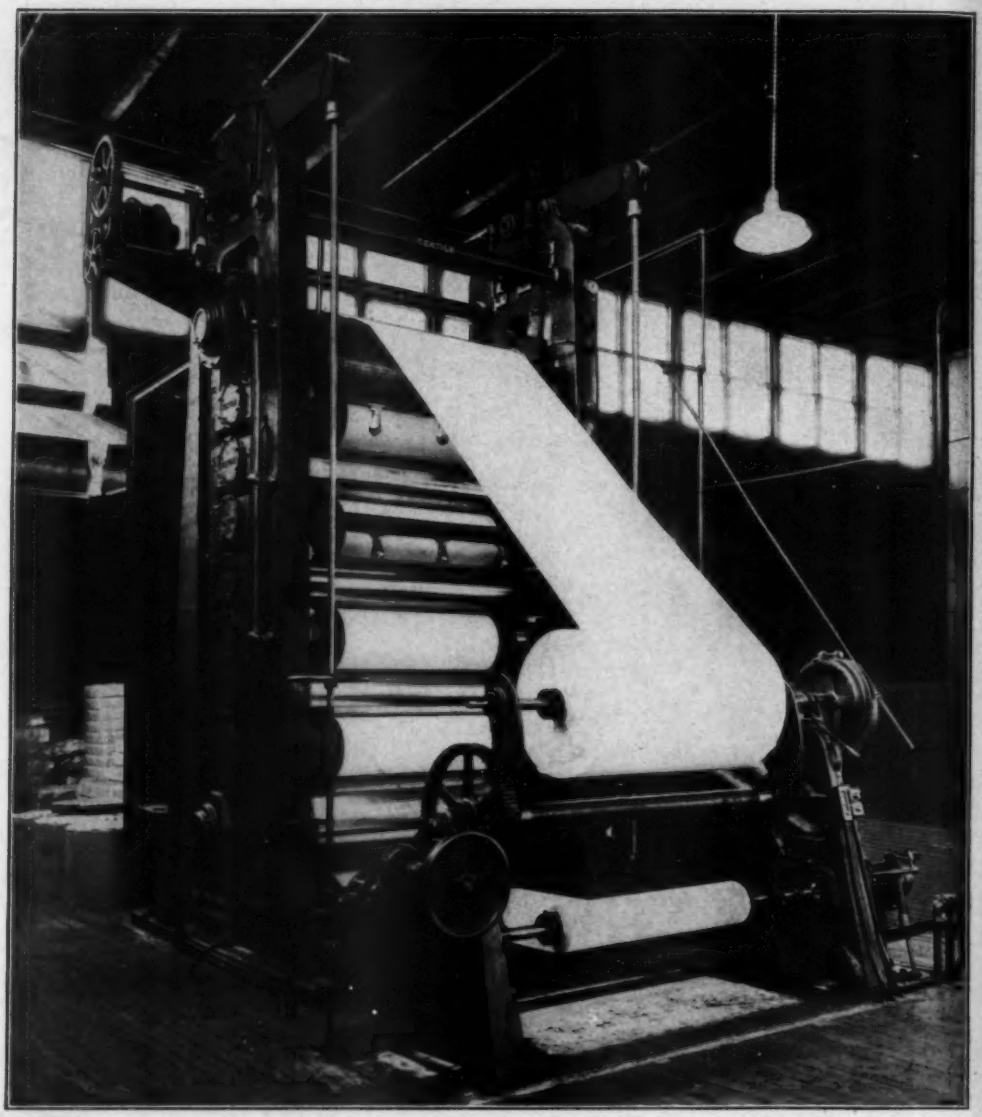
Super Calenders

- **to any width and number of rolls**
  Equipped with roller and ball bearings



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Super Calenders
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Publishers want better quality paper

FOR HALFTONE REPRODUCTIONS

TODAY over one-third of all national advertising in newspapers carries large halftones. This is an increase of over 500 per cent in five years. The percentage of halftones used in magazines is even greater. Hence, the need for a better quality paper by publishers and printers.

A recent survey by Prof. Gallup of Northwestern University brought out several rather astounding facts. One is that *pictorial* advertising, where actual photographs are reproduced, has greater attention value. Another fact is that editorial features that are illustrated with halftones, are the most widely read.

Publishers are being forced by advertisers as well as readers to print their publications better than ever before. Halftone printing requires a good, clear, better formed sheet, free from markings.

Beloit Shake and Suction Rolls Necessary

In order to give publishers the kind of paper they need today, the Beloit Shake and Suction Rolls are absolutely necessary.

We have made an extensive study of this subject, and to those papermills that are looking ahead as well as trying to render the kind of service that publishers need today, we have a most interesting story to tell. Write us in confidence.

The *Beloit* Way is the *Modern* Way

BELOIT IRON WORKS
Beloit, Wis., U. S. A.

Beloit Suction Couch Roll and First and Second Suction Presses, illustrated at left

Showing Beloit Universal Super-Shake installation at right

The BELOIT

THE PAPER INDUSTRY

SEPTEMBER, 1932
Vol. XIV—No. 6

A MONTHLY EDUCATIONAL JOURNAL
Devoted to the Interests of the Pulp and Paper Industry

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EDWARD B. FRITZ, Publisher
A. SCOTT DOWD, Editorial Director
HARRY E. WESTON, Editor
THOS. J. KEENAN, Contributing Editor

PUBLICATION OFFICE
333 N. Michigan Ave., Chicago
Telephone: Dearborn 8877

Eastern Office
New York, N. Y.
18 East 41st Street
Lexington 2 0357

Pacific Coast Office
Los Angeles, Calif.
1031 S. Broadway
Westmore 8501

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CRODON • • • • •

assures the best in chromium plate

SCREEN PLATES show no apparent wear after two years of normal operation, after being CRODON-plated. Material does not adhere to their smooth, polished surfaces. Slots do not clog—no cleaning is necessary—precision of the slot dimensions is permanently maintained.

SUCTION BOX COVERS reduce the wear of expensive Fourdrinier wires from 10% to 25%, with corresponding economies. Decreased friction, increased suction efficiency, lower operating cost and avoidance of other indirect costs—all these results from the use of CRODON.

PRESS ROLLS are chromium-plated to provide a hard, smooth surface which resists corrosion, prevents adherence of pulp and makes for easy cleaning. Long life without re-grinding, as well as reduced maintenance cost, is made possible by CRODON.

Chromium plating of paper mill equipment provides the hardest, smoothest and most perfect corrosion-resisting surface available. It is less expensive than most non-corrosive metals. It may be applied to your present equipment, whether new or used. CRODON does not crack, chip or tarnish.

Worn parts may be built up by chromium plating—the performance of the plated parts is a marked improvement over a new but unplated piece.

Can you afford *not* to take advantage of the economies made possible by CRODON? Let us show you what has been accomplished and what CRODON can do for you. Ask our nearest plant to send you Booklet No. 6, describing applications in the paper industry.

Chromium Corporation of America

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Cleveland Plant 3125 PERKINS AVE. CLEVELAND, OHIO.
CRODON *The Chrome Plate*
Chicago Plant 4645 WEST CHICAGO AVE. CHICAGO, ILL.
Milwaukee Plant 187 EAST BECHER ST. MILWAUKEE, WIS.

Member of Supply & Equipment Section—American Paper & Pulp Association

TIME TO THINK

SOMETHING BESIDES PRICE!

Because of its timeliness and its clearcut presentation of some economic truths, we are glad to reprint in part the statement of Mr. P. W. Litchfield, President of the Goodyear Tire & Rubber Company, Inc., in the July 2nd issue of the "Saturday Evening Post."

For more than two years, now, commodity prices in America have been dizzily on the toboggan.

In the frenzied competitive scramble for business, the last vestige of profit in many lines has been slaughtered to make a buyer's holiday.

It is true that within reasonable limits reducing prices in slow times as a stimulant to sales is a natural and effective action.

But it is also true that, like every other good thing, price-cutting can be abused to the point of diminishing returns, and may even damage the very people it seems to serve.

In a country like ours it is well to remember that the public which buys is also the public which builds and the public which sells.

So the hypodermic of price-cutting, however remedial, if carried too far may move in a vicious circle.

When prices are cut to the point where they strike at the jobs and earnings of the great body of people engaged in production, shrunken buying-power offsets shrunken price and defeats the appeal of increased value.

When price-drops become the expected thing, news of a lower price inspires fear of further cuts instead of confidence and eagerness to buy.

When price-whittling threatens quality of workmanship and quality of materials, the public is quick to sense that a cheapened product at a cheapened price is no bargain.

When quality is sacrificed, standards decline, reputations dim, progress stops—even the buyer loses.

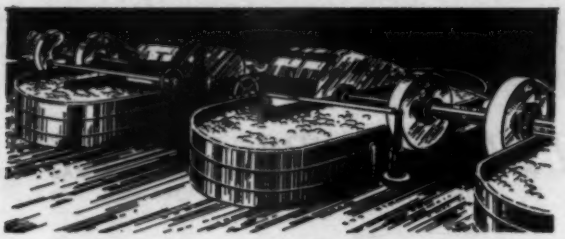
Reprinted by permission of Goodyear Tire & Rubber Company, Inc.

We endorse the above statement. Today, as for thirty-five years, Warren is giving value at a price that is fair to both buyer and seller—but will not sacrifice quality for price.

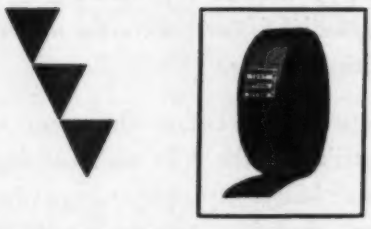
507

WARREN STEAM PUMP COMPANY, Inc.

WARREN, MASSACHUSETTS • *Agencies in all of the principal cities*



. . . On Your Beater Drives Too . . .



You'll find that Test Special, properly applied, will solve any transmission belting trouble you've ever had on beaters.

For Test Special has won its spurs on many of the most difficult and gruelling drives in some of the largest Paper Mills in this country. Test Special wins the implicit confidence of purchasing agents and engineers alike.

Test Special is a worthy leader in the famous line of N. Y. B. & P. Co. belting. Its inbuilt quality has kept up with industrial requirements for 86 years.

There are, of course, other products such as hose and packing in the N. Y. B. & P. Co. line. Each is designed and created to fit a particular need. Each problem of Paper Mill mechanical rubber goods requirements has a speedy and efficient solution in the wide range of N. Y. B. & P. Co. products.

• ***N. Y. B. & P. Mechanical Rubber Goods are sold exclusively through competent distributors*** •

NEW YORK BELTING & PACKING CO.

211 PASSAIC ST. PASSAIC, N.J.

TITANOX

CONSIDER THESE IMPORTANT PROPERTIES OF TITANOX-B

In your search for materials to improve the opacity and finish of coated stocks, don't overlook these important characteristics of Titanox-B (barium base). • (1) Fine particle size. (2) Exceptional brightness. (3) High color value. (4) Chemical inertness. (5) High refractive index. (6) Moderately high bulking value. • Made under carefully controlled conditions, and subjected to exhaustive physical and chemical tests at all critical points of manufacture, TITANOX-B (barium base) is noted for its uniformity of color, particle fineness, ease of dispersion and other characteristics which contribute to paper quality. • Paper manufacturers have also found that Pure Titanium Oxide (TiO_2)—another of our products—produces excellent results when used as a filler for book and magazine stocks. • On the basis of results secured by many leading paper makers, it will pay you to test Titanox pigments in your stocks. Write for helpful information.

TITANIUM PIGMENT CO., INC.

Manufacturers of.....TITANOX-B (Barium Base) TITANOX-C (Calcium Base)...PURE TITANIUM OXIDE

111 Broadway, New York, N. Y.; Curondelet Station, St. Louis, Missouri; Pacific Coast Distributor: National Lead Company of California, 2240 24th Street, San Francisco, California; Canadian Distributor: Wilson, Paterson, Gifford, Ltd., 101 Murray Street, Montreal — 132 St. Helen's Avenue, Toronto, Ontario.

STEAM TURBINE LUBRICATION

MONOGRAPH NUMBER 4

STEAM turbines directly connected to generators are of overwhelming economic importance, hence their lubrication is worthy of special study. The lubrication system normally consists of a pump for forcing oil under pressure to the bearings and governor, a reservoir to which the oil flows from the bearings, an oil cooler between the reservoir and the pump, and usually a filter or centrifuge through which the oil is continuously by-passed or run at intervals. Special lubrication problems arise because of the prolonged exposure of the oil to moderately high temperatures in service. This causes sludging or emulsification of the oil under certain conditions. To avoid danger or secure most economical and satisfactory operation, the following must be considered:

Oil viscosity should be kept within the limits established by experience. If too light, there may be trouble from excessive governor gear wear. However, for every eight seconds increase of viscosity there is about 1°F. rise in turbine oil operating temperatures. This means a slight power loss but, more important, causes more rapid ageing of the oil as described below. Therefore, turbine oil viscosities should be as low as is consistent with a necessary factor of safety.

Many turbine lubricating systems accumulate water which condenses from leaking steam packing glands or water coolers, or condenses in the circulating system when the turbine is shut down. This water may emulsify with the oil and be carried to the bearings where failures may be caused. Such emulsions are facilitated by dust, rust, or other solid foreign materials which are also abrasive and hence harmful in themselves. Every precaution should, therefore, be taken to keep water and all other foreign materials out of the system.

It is important to select oils which have a minimum tendency to form emulsions and which will retain for the maximum length of time in service the ability to separate rapidly from water. Since most oils will deteriorate in this respect at an increasing rate as their temperature is raised, it is desirable to keep operating temperatures as low as is consistent with other considerations. Usually, a temperature of the oil from the bearings of about 130°F. is considered good practice.

Reconditioning Schedules

Until recently, it has been essential to clean the lubricating system and change turbine oil completely or resort to various reclamation procedures at frequent intervals because of oil deterioration in service, as follows:

(a) Formation of acidity and other oxidation products which make the oil emulsify with water.

(b) Precipitation of insoluble impurities resulting from oxidation and emulsification of the oil. These form at an increasing rate as deterioration proceeds. The deposits form especially in oil passages, strainers, filters, etc., reducing the flow of oil and, in extreme cases, stopping it entirely. These sludges form especially in the oil coolers where they reduce heat transfer, raise the average oil temperature and thus accelerate further deterioration.

Various practices are followed to minimize or prevent trouble from oil deterioration in service. The most common system is a two-fold reclamation:

(a) Part of the oil (such as 10%) is continuously by-passed and either filtered or centrifuged.

(b) At intervals, typically every ten months, the entire batch is replaced by a spare batch and subjected to prolonged settling followed by filtering or centrifuging. Rarely, additional washing treatments are employed but these do not seem to be practical in most plants. When the oil is completely withdrawn, sludge is removed from various parts of the circulating system where necessary.

This system is used in over half the medium size to large central station installations and, with the assistance of the 20% a year average makeup oil typically used in such plants, secures fair oil quality but lubrication costs are high largely because of the reclamation equipment required.

Batch reclamation only is used in about one-fifth of the plants. This necessitates the use of considerable sweetening oil to maintain satisfactory quality but may be more economical than the first system.

Others use by-pass filtration only. This necessitates either a complete change of oil, typically at thirty month intervals, or large amounts of sweetening oil. Quality of oil and costs will depend on conditions at each plant but typically the costs are lowest of the three systems.

Economics of Turbine Lubrication

Final decision as to the most economical lubrication practice and oil should be reached only after careful scrutiny from an accounting standpoint of all direct and indirect costs entering into turbine lubrication. In addition to the items above, cost of the original fills with interest and credits as cheap engine oil for the used oil withdrawn from the system because of sweetening should be taken into account. In most instances, operators who have made such studies find that the more lasting oils are distinctly more economical in spite of their higher first cost.

Lowest cost lubrication usually is secured by using modern oils which form little, if any, sludge or acidity even after long service. Such oils eliminate all lubrication system maintenance charges except for the filtration of casual impurities, such as water, dust, rust, etc. Charges for lost operating time, labor for cleaning out deposits, sweetening oil, extra oil batches (original cost and interest), and fixed expenses for batch reclamation equipment can therefore be avoided.

The physical requirements for turbo-generator oils are so well known that consideration is seldom required. The opposite is true of the chemical stability of the oil, which may range in quality such that reclamation or change may be necessary after a few months service—or, on the other hand, may be avoided indefinitely with normal amounts of makeup.

Thus, lubrication engineering is of lesser importance in this service but, on the other hand the modern need for utmost economy dictates that operators secure convincing proof of the quality of the oils which it is proposed to use and then determine which will give the lowest final cost of lubrication, considering both quality and price. Turbine oils quality may be determined from previous service experience or, more accurately, from laboratory oxidation tests (such as the Rogers' Stability Test) which have previously been carefully compared with service results.

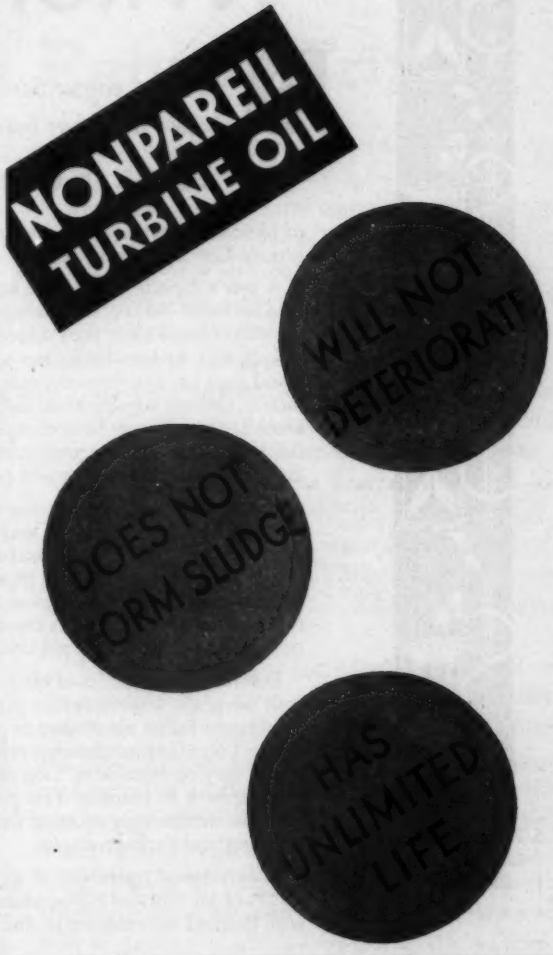
STANDARD OIL COMPANY (INDIANA) SERVICE

NOW GUARANTEED

Never in the history of industry has an unlimited guarantee been made for turbine oil.

To any firm operating turbines, the Nonpareil Turbine Oil Guarantee means the solution of a troublesome lubricating problem. It means the elimination of shut downs. It means a distinct saving in maintenance cost, wear and depreciation. Notice how broad and definite this guarantee is:

> "Nonpareil Turbine Oil will not deteriorate; will not form sludge and will not require replacement during the life of the turbine installation. When this oil is in use, your only lubrication expense will be for the replacement of losses due to evaporation and leakage, and for straining out water, rust, dust and other comtamination from outside sources.
>
> "We guarantee that Nonpareil Turbine Oil Medium and Heavy will last as long as your turbine, where the lubrication system is thoroughly cleaned before this oil is put into use and where Nonpareil Turbine Oil Medium or Heavy only is used for replenishment, and where the temperature of the oil from the bearings is kept below 170° F.
>
> "This guarantee has no time limit. If at any time, when the oil is operating under the above conditions, the neutralization number should rise higher than the extremely low limit of 0.15 when determined by A. S. T. M. Method D-188-27 T, we will cheerfully replace the oil without additional expense."



It is a fact backed by proofs, that many operators of turbines lose hundreds of dollars each year through lubrication troubles. Can you or any users of turbines permit this condition in your plant when you are offered the remedy backed by a broad definite lubrication guarantee such as has never been known to industry?

Now is the time to get Standard Oil Company (Indiana) lubrication engineering service and Nonpareil Turbine Oil, a Standard Oil product, working for you. Make a start by getting in touch with our nearest office.

STANDARD OIL COMPANY
(Indiana) 1709

910 S. Michigan Avenue Chicago, Illinois

A new leaf for Bookpapers NEWSPRINT and ..FRUIT WRAP

A Seven-League Stride to brighten groundwood paper stock has been made by perfection of the

HYDROSULPHITE PROCESS

of bleaching developed and recently patented by the Great Western Electro-Chemical Company.

A year's experimentation in actual mill operation has conclusively demonstrated the revolutionary effectiveness of the new process. From the darker hemlock of the Pacific Northwest, and even from discolored woods, zinc hydrosulphite has produced a brighter sheet of groundwood than has ever been thought of with the older forms of treatment such as sodium bisulphite or sulphite cooking liquors, and the treatment has consistently been completed *in a few minutes,* eliminating the costly 18- to 20-hour retention period previously necessary. Zinc hydrosulphite is already standard practice in several Pacific Coast mills.

No special equipment is required for the application of the new process. The hydrosulphite may be introduced easily through your present equipment, either close to the paper machine, in the beaters or mixers, or into the conveying pipes of a continuous system. The quantity necessary is never more than 1½% of the weight of the stock, and in some cases runs as low as one-tenth of 1%. Since hydrosulphite has only a slight effect on the pH value of the pulp all corrosion is avoided.

For the cheaper grades of book and magazine papers, newsprint, and fruit wrap, the hydrosulphite process makes tremendous savings and produces a better sheet than is possible with any other bleaching reagent. You eliminate heating costs, because the new treatment works at ordinary temperatures. You save valuable time by reducing hours for treatment to minutes. You provide a better product, at a price, to meet the increasingly exacting demands of present-day publishing, advertising, and package display.

Experimental quantities of zinc hydrosulphite can be supplied in drums of 50, 100 and 200 pounds. We shall be glad to answer inquiries with detailed information on the new treatment.

U. S. Patent No. 1,873,924
Canadian Patent
No. 307,440

GREAT WESTERN ELECTRO-CHEMICAL CO.

9 MAIN STREET, SAN FRANCISCO
SEATTLE

PLANT: PITTSBURG, CALIFORNIA
LOS ANGELES

LIQUID CHLORINE **BLEACH** **AMMONIA** **ZINC HYDROSULPHITE**

Prosperity on the Return Trip

WE have before us some dozen letters from as many executives of the leading mills in the industry regarding the outlook for better paper business.

They make interesting reading.

The digest of them is that they find no improvement at present; the fly in the ointment pot is continued low prices and below-cost operations; they are all optimistically expectant and yearning for the upward trend.

We know these letters represent a true cross-section of the industry's condition. Without exception, the opinions are freely and frankly given; the digest as given above is therefore open for interpretation.

There is no improvement in paper business at present. That is not wholly discouraging. We have been through a long and drastic deflation in the industry, caused by an unprecedented tonnage installation and inflation combined with a natural depression of unusual severity. The bottom of the depression has been reached in general business. The turn upward and back to normalcy has begun. The adjustment of the overproduction of paper is still to be solved and must precede a return of higher prices and expanded business. Naturally, the paper industry is not showing the immediate improvement concurrent with the improvement in other lines, but the groundwork for better paper business has been laid.

Better paper business is on the way and the industry will as certainly return to peace and profit as the sun is to rise tomorrow morning. The expansion of general business always precedes an expansion in the paper business. However, with the general business expansion assured, the consequent expansion of the paper business is a sure bet.

Our correspondents are all optimistically expectant and rightfully so. None of the letters before us sound any hopeless notes. They all breathe hope and betterment. These men know that there are problems, peculiar and pressing in the paper industry, that are yet to be ironed out, but they know they will be ironed out eventually. They wouldn't be human beings if they did not reflect a spirit of restless dissatisfaction with the delay which is inevitable.

They all know what the problems are. As long as they are to be solved eventually, why not now? Ah! There is the rub. It just cannot be done now—it will take time. Christmas is a certainty, but we must be patient and await its arrival; it is not to be celebrated in September.

The regeneration of the paper business is a foregone conclusion. It is as certain as the election of a president in November. However, the time intervening between now and the regeneration is as necessary and valuable as the time between now and the November election. We need the time to make the event a reality and a certainty.

So, this is the cheering message of the month: Buck up, cheer up, and carry on. The depression is over in general business—we are on the way up. The big waves of expansion in business will reach every shore of every industry; doubt not the evidence of your sense. Let no carping critic or cryptic cynic persuade you that prosperity is not on a return trip to this country and every industry in it, including the paper industry.

+ EDITORIAL +

Now Is the Time to Buy

EVERY paper mill executive should be stimulated by a recent announcement of James H. Rand, Jr., chairman and president of the board of Remington Rand, Inc. In this announcement it was stated that at least 24 per cent of a $4,500,000 order for supplies, issued during the latter part of August, will go for paper and paper products. This order for supplies only covers requirements until the end of the year.

Mr. Rand has further instructed his purchasing department, according to the announcement, to place contracts, wherever possible at present prices, to cover all of the company's requirements for 1933. Such contracts are to be based upon an anticipated 25 per cent business increase for the year over that of 1932 requirements.

Surely Mr. Rand and his associates have shown their faith in the integrity of American business.

Does it not seem that this same faith should be exhibited by the papermaking fraternity as a whole? Is it not time to put the individual plant in order? Equipment, just as is true in the case of paper, can be purchased today for a smaller price generally than it has been possible to buy it for a number of years past. Why procrastinate? If in position to buy—***Buy!*** It will not only tend to relieve unemployment in the paper industry, but will also aid in turning the wheels of American pulp and paper mill equipment manufacturers.

The mills that are in readiness when prosperity returns will be in position to profit by their investment during this economic lull, out of which business as a whole seems to be emerging. If your plant is not in readiness to accept business when it comes, do not offer the excuse of the old Arkansas farmer, who when questioned about repairing the leaky roof of his house, replied that the roof needed no fixing when the weather was good, and it couldn't be fixed when the weather was bad.

Your Business Personality

EVERY business has a personality. It may be the personality of the head of the business, who by his wisdom and energy has imparted it to every member of his organization and to the trade that the business serves, or it may be a personality that is somewhat uncertain as to its origin but, nevertheless, real. These personalities may be an asset or a burden to the individual business.

There are certain business firms, for example, with which you like to do business, just as there are certain individuals with whom you like to associate. There are other firms, perhaps, for which you have only a lukewarm feeling. They may be in position to render excellent service, and yet under ordinary circumstances your business finds its way to manufacturers for whom you have a friendlier feeling. Then there may be a third class of firms, firms with which business relations would be intolerable. Under no circumstances would you desire business dealings with them; nor could you recommend them conscientiously to any one that might make inquiry about their services.

Analyze your business personality. If it meets with your full approval—more power to you. If there is something about it that for some reason is giving you unfavorable response, try to correct it. Conscientious effort will not go unrewarded.

Process Control

CAN you picture any large, urban community without some form of traffic control? A few years ago the traffic policeman was all that was required. Now the use of electric signals, properly timed, makes it possible for heavy traffic to move across street intersections or arterial highway crossings with the least amount of inconvenience and danger. The use of these signal lights has so simplified this movement of traffic.

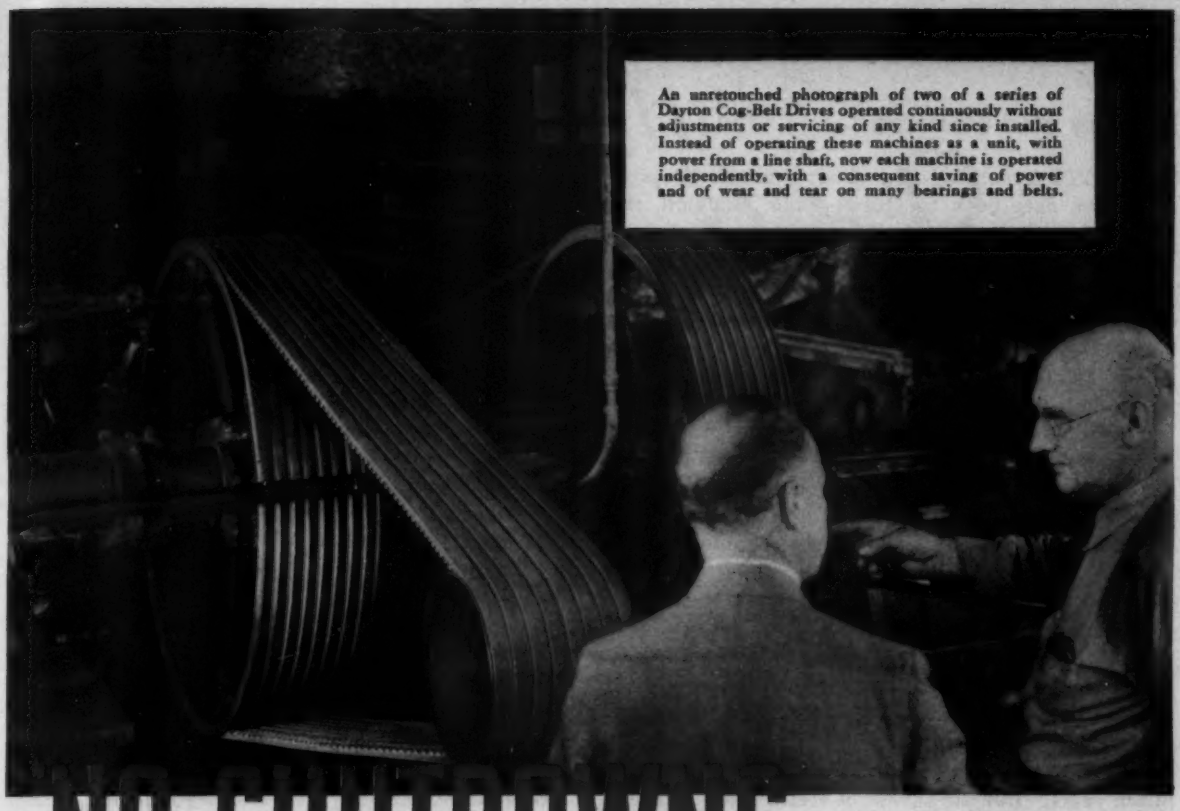
Instruments have also been designed to simplify the control of industrial process operations. In the manufacture of pulp and paper are many operations where control is absolutely essential. Some of these control points are fully appreciated by the entire industry, while others have received apparently little consideration.

It is hoped that the article suggesting various control instrument applications, as it appears in this issue, will point the way for you toward effecting further economies within your plant.

What of the Future?

HAVE you ever thought of the man who is to fill your shoes? If your business has been built with any idea of permanency, you should be interested in him. Upon him depends the future success of the business that you may have created or which you may have guided over quiet as well as troubled waters.

Give thought to the future, and if you think it advisable, train some one to carry on. He may be your son, your partner, a business associate, or perhaps, at the moment, some one you do not know. When chosen, tell him of the dangers you have encountered, the battles lost and won, and give him in untold ways the benefits of your knowledge and experience. It will be an inspiration to you and a stimulus for him.



An unretouched photograph of two of a series of Dayton Cog-Belt Drives operated continuously without adjustments or servicing of any kind since installed. Instead of operating these machines as a unit, with power from a line shaft, now each machine is operated independently, with a consequent saving of power and of wear and tear on many bearings and belts.

NO SHUTDOWNS *since we've installed these* DAYTON COG-BELT DRIVES"

This was only one of the statements made by an executive of a prominent plant.* He went on to tell how Dayton Cog-Belt Drives have saved space . . . eliminated all unnecessary power waste and loss . . . how now with individual drives *only one,* or *all* of these machines may be operated as production requires . . . how there has been no expense for belt replacements, adjustments or dressings . . . how these modern Drives have increased production at a lower cost.

And such expressions are typical of what plant executives say wherever Dayton Cog-Belt Drives are used. Dayton Cog-Belts, with their *exclusive and patented cog construction,* are far more flexible. *They're built to bend* . . . easily, at high speed, around small diameter pulleys. There's no distortion, no internal heating. And because they're *built to bend* they permit shorter center-to-center distances, saving floor space.

But that isn't all. With Dayton Cog-Belt Drives, speeds are positive. There's no slipping or sliding. For the sides of the belt are *die-cut* . . . *not molded* . . . another exclusive Dayton feature. And the die-cut, raw edge contact surface provides greater gripping power. As a result, machines are kept running faster, steadier, smoother.

These are just a few of the economies offered by the Dayton Cog-Belt Drive. There are many more. Let us send you the complete story . . . tell you in detail how Dayton Cog-Belt Drives would save money for you in your own plant. We'll welcome your inquiries.

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COG-BELT DRIVES

CURRENT THOUGHT

Panics and Politics

By WILLIAM SIBLEY

THERE is nothing new about a panic. Depressions date back to Queen Dido, Babylon, the Pharaohs, and Confucius. What we most need right now, particularly since this is a presidential year, is to glance over the pages of history and profit by the experiences of former years.

Probably the first "Made in United States" depression was that of 1786. That was a period which wellnigh cost this country its existence.

The Post-Revolutionary-War Depression didn't last long. It was completely forgotten in the era of land speculation which followed. A period in which great tracts were bought on credit, entire towns laid out, and immense forest-clearing projects undertaken. Even the War of 1812 failed to stem the tide of land inflation. It was not until 1819 that the crash occurred; land values declined 70 per cent; merchants were ruined; unemployment became nation-wide.

But the hard times of 1819 passed the way of all rainstorms and blizzards. The Erie Canal and the Cumberland Road started speculation anew, with the result that bank loans increased nearly 500 per cent in ten years. But the advent of steam boats and railroads made people realize that canals were a shaky investment. In the panic that ensued (1837) every bank in the United States but one closed its doors; six states repudiated their public debts; public works were discontinued, and the Government piled up a deficit that staggered the young nation.

But the lessons of extravagance and speculation went unheeded. Twenty years later (1857) saw the first of our two great railroad depressions. Railroad expansion and rail investments had gone wild. In fact, the pendulum had swung so far that during 1857 every class 1 railroad went into the hands of receivers and literally millions were unemployed.

Sixteen years later saw the Post-Civil-War Panic of 1873—caused by reckless speculation and currency inflation, overbuilding of railroads and unjustified governmental expenditures. The huge wastes in public funds, and the sharp practices in banking, insurance and industrial circles, led to scandal after scandal. In this panic, cases of actual starvation were not uncommon. Lawlessness ran rife.

In every one of these depressing periods, as in 1893, 1907 and 1921, the United States was brought to the crossroads of social and political changes. And every one of these major depressions resulted in beneficial changes to our laws, methods and practices. But in every depression the same identical political ballyhoo was handed out. The party in power steadfastly maintained that its respective slump was unavoidable. The political party seeking power always blamed the incumbent for business ills. Never did the party in power offer drastic changes to governmental structure. Never did the party out of power fail to advocate restorative nostrums.

As a matter of fact, the existing party's adherence to established standards, of the seeking party's advocacy of legislative panaceas has always been largely sheer bunk, since the mere presidential chair never has, and probably could not, exercise enough power to prevent a panic. A panic is a national event involving the entire population, and political parties, however powerful, are impotent to do more than break the fall.

Had Mr. Hoover been the president to follow Harding, we would have had a Hoover Prosperity. In like measure, Mr. Coolidge would have been the same victim of circumstances that Mr. Hoover now is, had he been elected in 1928. Because neither Mr. Coolidge, nor Mr. Hoover, nor Mr. Smith could have altered the nation-wide spread of reckless speculation which led to our present panic.

Had Horace Greeley, Horatio Seymour, or Samuel J. Tilden, been president of the United States, instead of James A. Garfield, the panic of 1873 would have occurred just the same, since neither these men nor the parties they represented were big enough to check outright thieving on the part of banks, insurance companies or industrial firms, or to stem the tide of wild investments in railroad expansion.

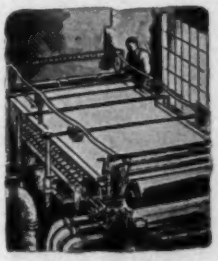
Suppose William H. Seward, or George Brinton McClellan, or Stephen A. Douglas had been president of the United States during 1857, do you suppose their incumbency would have sufficiently altered conditions in France, Russia, and Great Britain, or exercised enough power to prevent land speculation, and thereby saved the country from the depression of 1857? Certainly not! Nor would Henry Clay, Lewis Cass, or Daniel Webster have avoided the panic of 1837.

Let's keep our feet on the ground and our heads clear in the coming presidential election. We are in for a lot of political verbiage and vote-getting tommy-rot. Probably it can't be helped since it has always existed. What we need to do is to cut through the fog of words and seek out the man who will take this depression as the means to the end of reducing our governmental expenditures by a billion or two, and institute the needed changes in our financial structure. Making a smokescreen of prohibition, or advocacy of governmental doles of one kind or another isn't the way out.

The backbone of the present depression has been broken. Let's not go haywire in the coming election.

Here's one that's ENGINEERED

LOOK AT THE DIFFERENCE!



Many shower pipes are built — a Rainstorm is engineered. Look at the difference!

Maximum scouring action is obtained with lower pressures . . . less water is used . . . less power is consumed at the pumps . . . all dirt is kept off the screens or felts.

Here is how it's done.

In a Rainstorm, two small water streams are made to impinge at a predetermined angle —the resultant is a flat spray with nearly 50% increased velocity at no increase in initial water pressure.

During cleaning, all dirt is loosened from the inside by scrapers—a valve is opened in the end of a Rainstorm, and the rush of water carries all dirt out and away from the screen or felts—accomplished without removing the pipe or changing its position.

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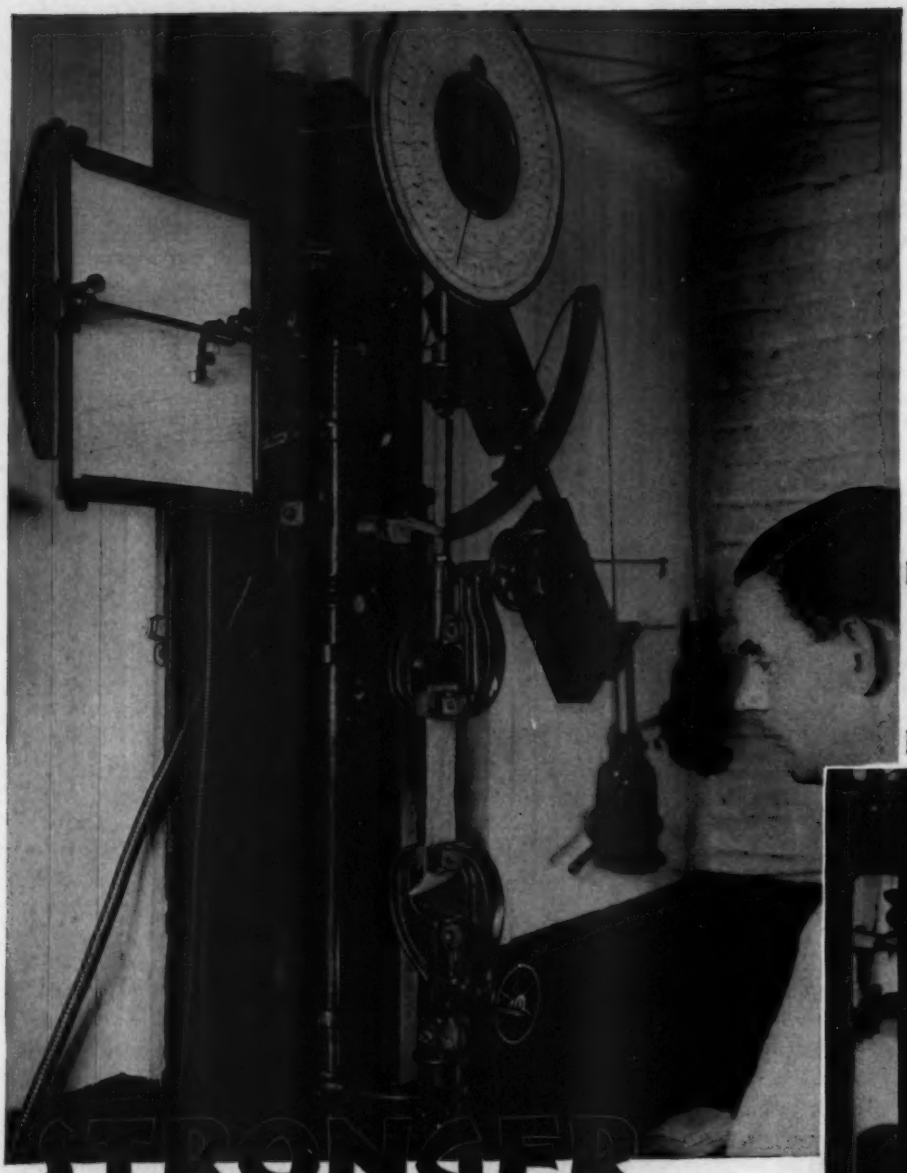
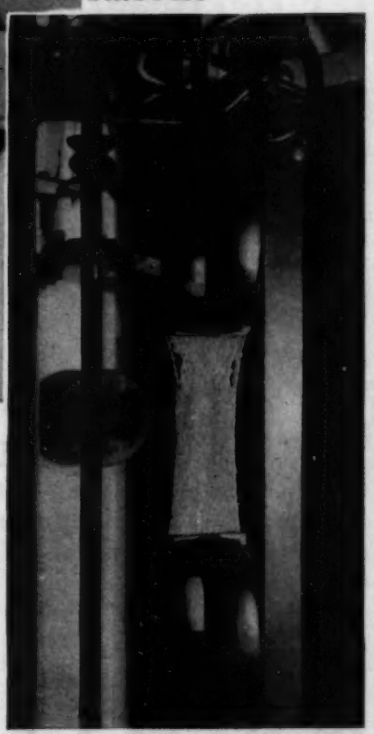


The instrument shown in the photograph is used to measure and record the tensile strength of Kenwood Tanned Felts. This is one of the details of control exercised by Kenwood laboratories to assure the utmost in uniformity to users of Kenwood Tanned Felts.

KENWOOD WOOL PRODUCTS

STRONGER



Guesswork and unsupported claims play no part in Kenwood Tanned Felts. FACTS—known and proved FACTS—guide and control every detail to the end that through Kenwood Tanned Felts, paper manufacturers shall enjoy the advantages of greater strength, increased openness, superior surface and longer felt life.

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5% TO 12% HIGHER EFFICIENCIES

AT LOWER COST

GOULDS was not content to sit back and wait for better times.

Instead of curtailing research activities, Goulds has intensified them in the past year. What has been the result?

One result is this announcement of a line of Double-suction Centrifugals even more efficient than previous pumps of similar type, far less costly to operate. Power savings are sufficient to justify discarding obsolete pumps and purchasing of new ones under today's conditions.

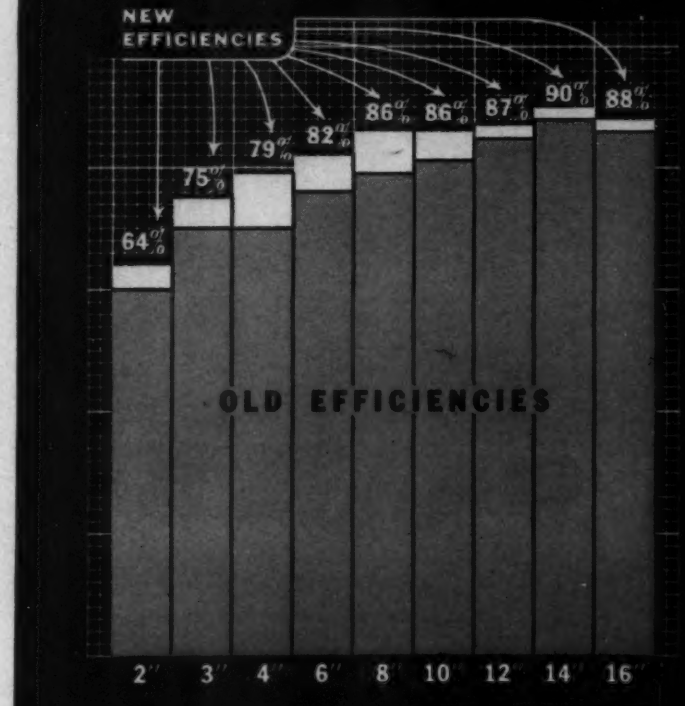
But not only in increased efficiencies (from 5% to 12%) are these pumps notable. They are priced lower than ever before, and this low price is not simply a reflection of today's commodity and labor prices. It results principally from a new system of standardization . . . an interchangeability of parts which permits quantity manufacture and consequent lower cost. For instance, with 33 different types and sizes, only 6 different shafts, sleeves, glands and bearing assemblies are used.

All this took a full year's sustained effort. But the new Goulds Double-suction Centrifugal Pumps are worth it; higher efficiencies than ever . . . proportionate saving in power consumption . . . lower operating cost . . . lower first cost.

Goulds Research, of which the above is but one example, costs $1500 a week. It is Goulds guarantee of continuously better performance. It is justified by the results which Goulds is thereby able to offer users of Goulds Pumps.

Goulds Pumps, Inc., Seneca Falls, N. Y. Branches and agents in principal cities. World's largest makers of pumps exclusively.

NEW PUMPS REDUCE POWER COSTS

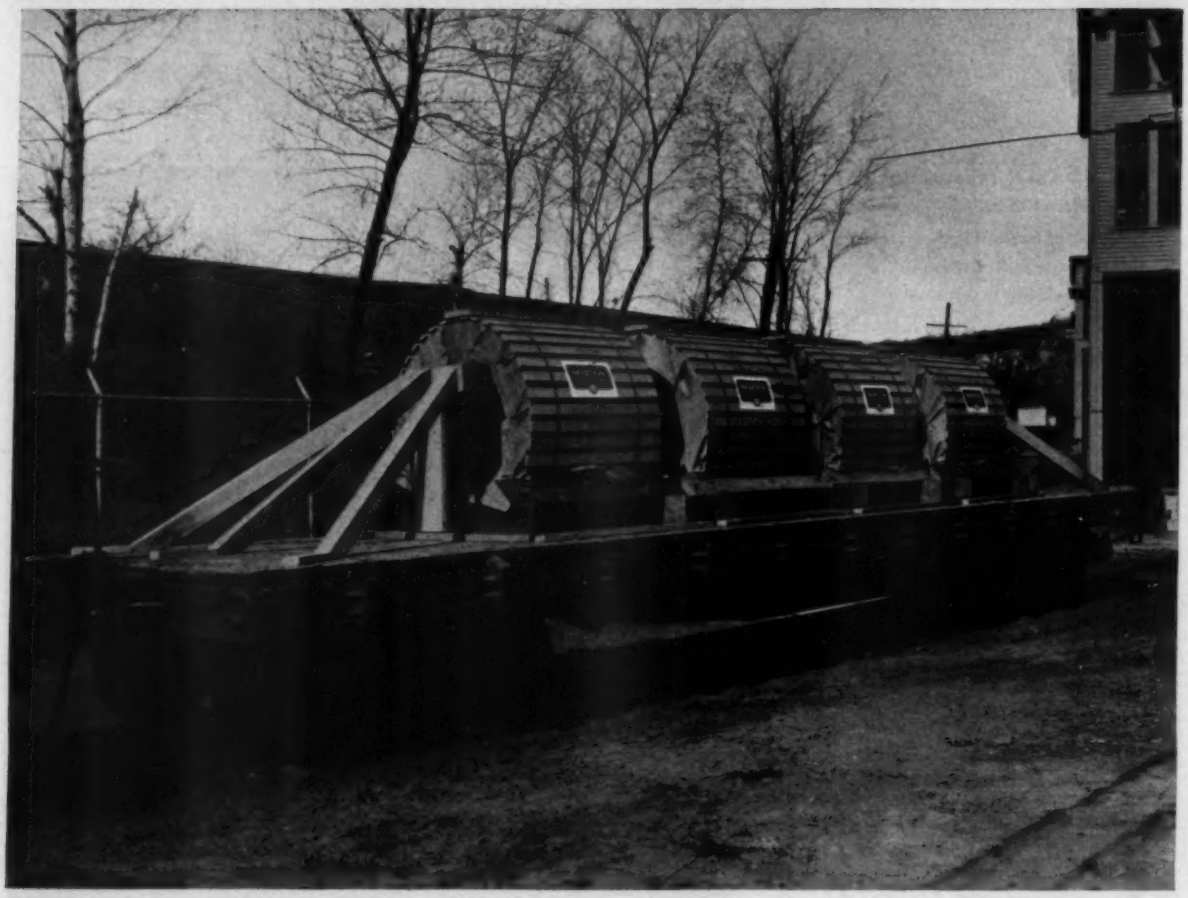


TYPICAL EXAMPLES OF NEW AND OLD EFFICIENCIES OF VARIOUS SIZES OF GOULDS DOUBLE-SUCTION CENTRIFUGAL PUMPS

$1500 A WEEK FOR BETTER AND BETTER PERFORMANCE

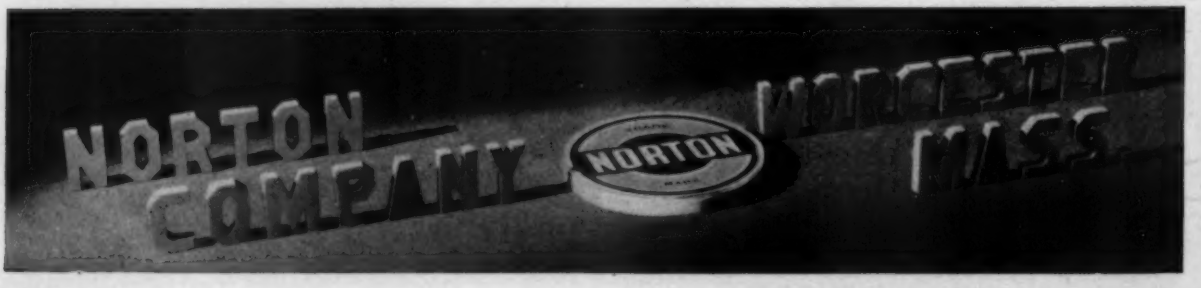
GOULDS PUMPS

NORTON PULPSTONE



Eight years ago, the Norton stone was merely "on trial." Now, it is an accepted product.

A number of mills have reached the ideal condition "A Norton Pulpstone for every grinder"—and many others have made plans for 100% Norton.



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use DU PONT PURPURONE 4B CONC.

THIS DU PONT dyestuff is very brilliant in shade. Possesses excellent cold water solubility and is well suited for cold beater work. You will find it very economical when used for deep Christmas Red tissue shades, and in all red to scarlet shades of wrapping and similar papers.

When used in waterleaf for Vulcanized Fiber, Du Pont Purpurone 4B Concentrated gives very satisfactory results.

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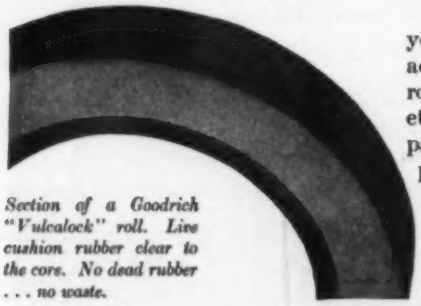
There's NO CUSHION in HARD RUBBER

Section of a hard rubber base roll. On a roll of this type, with 1" cover, the hard rubber is about ¼" thick. This hard rubber represents 25% waste for it is dead *rubber . . . valueless as a cushion.*

WHY *pay for it?*

THE picture above shows a section of a typical *hard rubber base roll.* Its cover is ¾" cushion, ¼" hard rubber.

This ¼" of hard rubber is useful only to the *manufacturer* of the roll. It may be fastened to the roll's metal core. And in turn the cushion may be vulcanized to the hard rubber. An indirect method, but the only one possible . . . without "Vulcalock."



Section of a Goodrich "Vulcalock" roll. Live cushion rubber clear to the core. No dead rubber . . . no waste.

The hard rubber in this roll does you no good. You are paying for cushion. What do you get? ¾ less cushion . . . ¼ less wear . . . and a further loss when it's time to re-cover the roll. For hard rubber is *dead* rubber. It has no cushioning value.

To re-cover a hard rubber base roll you have to re-rough-thread, then add rubber to the cover to build the roll up to the correct outside diameter. So every time you re-cover, you pay for a thicker cover. On every point, the hard rubber base, a manufacturer's compromise, is your loss.

Now glance at the section of "Vulcalock" roll shown at the left. The difference is obvious. No compromise here. The cover is 100% live cushion clear to the core. It returns one hundred cents on every dollar . . . in cushioning . . . in wear.

An exclusive Goodrich development, the "Vulcalock" Roll is the *only* roll that does not have a hard rubber base. It is the *only* roll that makes unnecessary the vulcanizing of two different kinds of rubber at once . . . with the possibility of formula changes to make them adhere to each other. A "Vulcalock" cover can be compounded *exactly* to your specific needs.

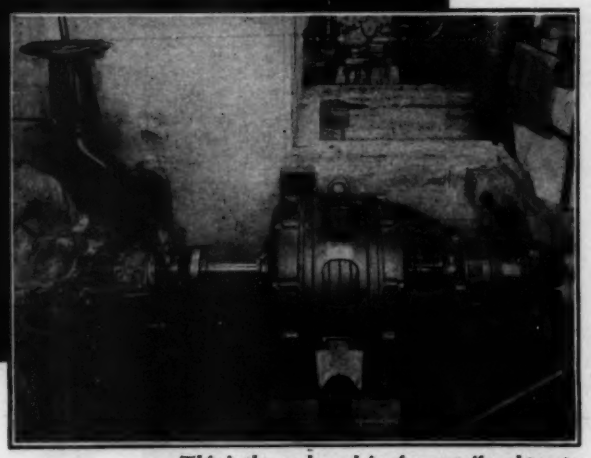
Performance facts and figures describing "Vulcalock" rolls may be had for the asking. Address The B. F. Goodrich Rubber Company, (Est. 1870) Akron, Ohio.

B. F. Goodrich

VULCALOCK PAPER MILL ROLLS

Save $18,000 yearly in Pumping Costs

IF YOUR PAPER MILL USES 5,000 KW.



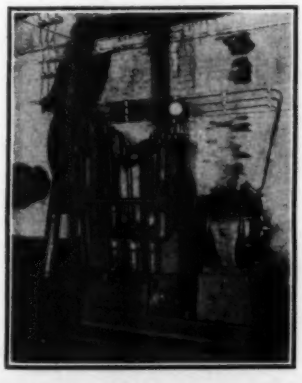
This is the modern drive for centrifugal pumps. A 125-hp. Westinghouse Synchronous Motor driving a Bingham pump. Moisture-proof insulation, and sealed bearings assure maximum economy of operation.

Improved Equipment

Cuts Pumping Power Bill . . *in half*

WITHIN the past ten or fifteen years, the efficiency of centrifugal pumps has been increased more than that of any other equipment used in paper mills. Substantial advances also have been made in pump and pipe layouts and in motor efficiency.

These improvements have a substantial dollars-and-cents value to every paper mill that is now using inefficient, slow-speed pumps of obsolete design.



Here is an old-timer that was the "last word" in pumping equipment a quarter of a century ago—but it's an expensive luxury today.

With 1932-model motors, pumps and pipe layout it costs only about half as much to handle liquid as it does with old designs, many of which are still in use.

For instance, a paper mill with a connected load of 5,000 kw., uses about 10% or 500 kw., to drive pumps, if all this equipment is obsolete. By installing modern motor-driven pumps, 250 kw. will be saved, which at a one-cent power rate equals $60 per day or $18,000 per year!

Proportionate savings can be made in any paper mill with obsolete pumping equipment by installing modern, efficient pumping systems.

Let us send you complete information about the modern Westinghouse pump motors. You will be interested in their features of low cost operation, long life, low maintenance and freedom from shutdown. Write our nearest office.

Westinghouse

Quality workmanship guarantees every Westinghouse product

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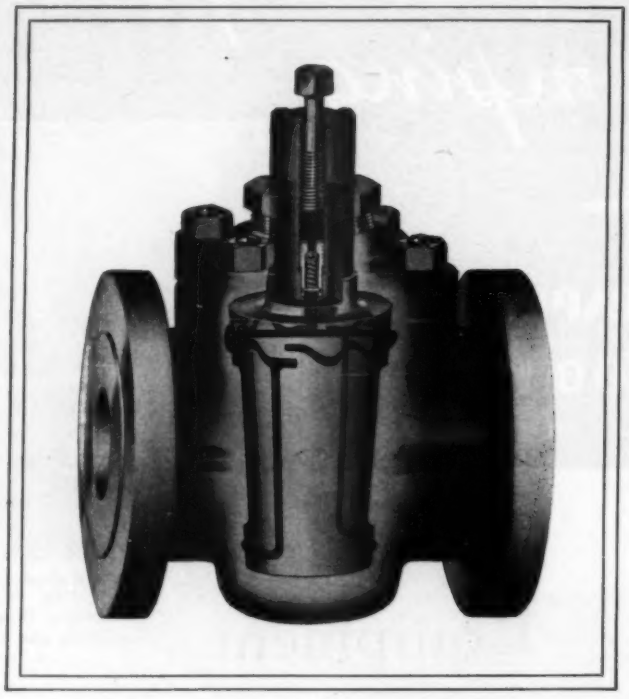

The experience of sixty years in the manufacture of cocks, and seventy-seven years in the manufacture of valves, has been incorporated in the design of a new line of Lubricated Plug Valves.

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THE PAPER INDUSTRY

A MONTHLY EDUCATIONAL JOURNAL

Chemical Research Trends

Recent fundamental investigations affecting the pulp and paper industry.

By LOUIS E. WISE, Professor Emeritus
New York State College of Forestry

ONE of my colleagues used to ask his students a question which often baffled them and me: "Should lignin be considered a raw material in papermaking?" It was a double-barreled question with two answers: (1) "Yes," if you are manufacturing newsprint; (2) "No," if you are making most other kinds of paper.

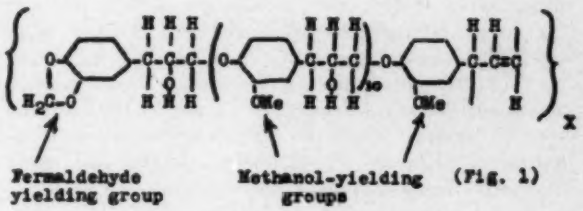
Personally, I doubt whether lignin was ever seriously considered more than an accidental and undesirable component by most papermakers. Yet its tremendous importance cannot be denied. It is present in all woods and straws, and it must be excluded, as far as possible, from the highest grades of chemical pulp. That, in itself, has presented a challenge to the chemist, and lignin has been an intriguing field for research ever since old Anselme Payen of the Arts et Metiers in Paris made his first abortive attempts to separate and classify the encrusting substances of wood, about a century ago.

Perhaps for most sulphite pulp makers, lignin is of negative interest. They want their product free from this substance. On the other hand, they would be overjoyed to know how to utilize economically its embarrassingly voluminous by-products. It has always been an interesting nuisance.

Lignin Researches

Studies during the past two years have shown clearly that lignin still stimulates the imagination and the hands of the research worker. "Let us find out more about the nature of lignin and its derivatives" say the chemists; "give us more data regarding its genesis and its possible removal from the plant cell wall, and eventually pulp making technology will be the richer—richer in knowledge and richer in worldly goods."

One of the outstanding, if not the foremost, of the research workers is Professor Karl Freudenberg[1] of the University of Heidelberg. To outline even a small fraction of his experimental work and that of his students would require a separate article. Briefly, he has shown that lignin is a porous mass *(Filzmasse)* comparable to cement, and that its formation in the cell walls of plants probably takes place in two stages. First, we have the physiological synthesis and etherification, and union of approximately twelve molecules of the substance caffeic alcohol with the formula: 3,4—$(HO)_2C_6H_3CH_2CHOHCH_2OH$, together with the methylation and formalization of the phenolic hydroxyl groups. This would yield a product depicted as follows:



(Fig. 1)

The second stage takes place in the moribund woody-tissue or when chemical means are used to isolate the lignin. The lignin chains, shown in Figure 1, are then polymerized to larger aggregates of indefinite size.

Freudenberg's hypothesis regarding the aromatic linkages in lignin is fortified by his extensive researches with coniferyl alcohol and salicyl alcohol. One important fact should be emphasized. Freudenberg has never studied lignin apart from his studies of cellulose. His viewpoint has always been that of an investigator broadly scanning the structure of lignified tissue in its entirety. The sum total of his intensive and thorough microscopic, polariscopic and X-ray investigations has led to the definite conviction that, in woody tissue, lignin and cellulose are not chemically combined. The time-honored term lignocellulose thus has no precise chemi-

[1]Freudenberg, Sohns, Dürr, and Niemann, *Cellulosechemie*, 12, no. 9:263 (1931).

cal meaning, and should truly be relegated to limbo.

In mentioning Freudenberg's work, we should comment on the remarkable pioneering studies of that brilliant octogenarian, Dr. Peter Klason of Stockholm, who continues his important researches, and has recently made his sixteenth contribution in this field.[2] He has investigated the structure of the reserve lignin in wood,[3] which seems to lend pliability to the branches, giving them the resiliency to withstand the strains placed on them by the snows and heavy winds.

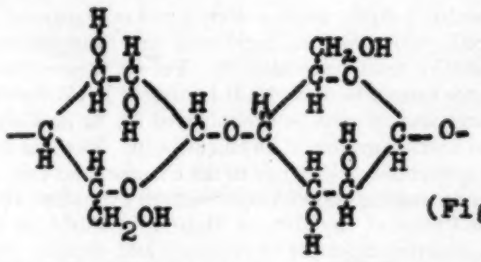
A new method of attack on the lignin problem has come into vogue. The absorption spectra of lignin solutions have been determined. In the United States these studies have been carried out at the Forest Products Laboratory by Stamm, Semb and Harris.[4] In Finland, Klingstedt,[5] after investigating the absorption spectra of a variety of lignin derivatives, concludes that the lignins are very similar in general constitution (i.e. in skeletal structure), despite certain differences between hardwood and softwood lignins, with regard to the position and intensity of their absorption bands. Klingstedt's work points to the presence of at least one aromatic ring in the lignin molecule, a conservative finding in the light of Freudenberg's investigations. In Germany, those who blazed the trail for ultra-violet absorption spectra methods as applied to lignin, have continued their fruitful labors. Dr. R. O. Herzog, who was actively at work in this field when the writer visited him in his institute at Berlin-Dahlem in 1927, and his co-worker, Hillmer,[6] have recently published several papers dealing with the same subject. These also show that the lignins from various sources are very similar but not identical in chemical structure. The lignins derived from coniferous woods show slight but appreciable variations from those isolated from the cereal straws. These in turn show faint differences from the lignins derived from hardwoods.

In recent years, two general theories regarding the genesis of lignin have been advanced. The first theory, supported by F. Erlich, assumes its formation from certain sugars, the pentoses. These yield the pentosans which play a role in the formation of pectins, and thence are converted into lignin. The second theory accepts an aromatic nucleus related to phenol as the building stone of lignin. While the latter harmonizes with the findings of Klason, Freudenberg, Herzog and many others, the former hypothesis has certainly not been laid at rest. In any event, the use of absorption spectra has been and will probably continue to be an important development in the study of the lignins.

Another phase of research of more immediate interest to the pulp maker has included critical studies of the lignin determination. Sherrard and Harris[7] have shown that in the use of sulphuric acid (which is usually employed in isolating and determining the lignin of wood), temperature, time of reaction and acid concentration must be watched very closely. By using 70 per cent sulphuric acid at 10 deg. C. over a period of 16 hours, these chemists obtained a product free from carbohydrates, more readily methylated and having a higher methoxyl content than the lignin fractions isolated by other methods. Their investigations have led to modifications in the customary analytical procedure for determining lignin.[8] An excellent bibliography of the lignin determination, up to August, 1931, is given by E. D. Amstutz.[9]

The Cellulose Molecule

The size of the cellulose molecule has often been a subject for lively debate. When the writer was a graduate student over twenty years ago, no one questioned the hypothesis that the cellulose molecule, as molecules go, was relatively enormous. However, six or seven years ago, largely through the interpretation of data obtained by Dr. Kurt Hess, it came to be believed in many quarters that the cellulose molecule was, after all, quite small. In the minds of the observers, it appeared to have shrunk. And now, when everything else has been thoroughly deflated, the cellulose molecule has come back into its own. Surprisingly enough, it has grown in stature. Many investigations, including the X-ray studies of Sponsler and Dore, and the brilliant researches of Staudinger and of Meyer and Mark, have forced the gradual abandonment of the small molecule idea. We now visualize cellulose again as a large molecule, made up of the frequently recurring anhydrocellobiose unit:



(Fig. 2)

Just how often this unit is repeated in the molecule is still a moot question. On the basis of viscosity measurements, Staudinger and Schweitzer[10] concluded that cotton cellulose contained at least 500 such units. Other investigators like Stamm, who adopted Svedberg's ultracentrifuge method to the molecular weight determination of cellulose, arrived at about one-fourth of this value. A cellulose molecule containing not over 100 such units is pictured by the great British investigator, Haworth.[11] To the reader, this may not look like such very good agreement, but to the writer it seems remarkable.

The minimal size of the cellulose molecule has also been suggested by purely chemical means. Schmidt, Simson and Schnegg[12] have reported that all celluloses examined contained 0.28 per cent carboxyl groups. In other words, cellulose is actually slightly acidic. In-

[2]Klason, *Ber.* 65, no. 4:625 (1932).
[3]Klason, *Svensk Pappers Tidn.*, 35, no. 5:152 (Mar. 1932).
[4]Stamm, Semb and Harris, *J. Phys. Chem.*, 36, no. 5:1574 (1932).
[5]*Klingstedt, Pappers-Travarutid. Finland*, 13, no. 20:908 (Oct. 10, 1931); 21:933. (Nov. 11, 1931) giving English summary.
[6]Herzog and Hillmer, *Ber.*, 64 no. 6:1288 (1931); *Papier-Fabr.*, 29, no. 23A:40 (June 1931).
[7]Sherrard and Harris, *Ind. Eng. Chem.*, 24 no. 1:103 (1932).
[8]Ritter, Seborg and Mitchell, *Ind. Eng. Chem. Anal. Ed.*, 4, no. 2:202; Peterson, Walde and Hixon, *ibid.*, 216 (1932).
[9]Amstutz, *Bull. Institute Paper Chem.*, at Lawrence College, 2, no. 3:143 (Nov. 1931).
[10]Staudinger and Schweitzer, *Ber.* 63, 3132 (1930); 64, 1688 (1931).
[11]Haworth, *Nature*, 129, 365 (Mar. 5, 1932).
[12]Schmidt, Simson and Schnegg, *Naturwissenschaften*, 19, 1006 (1931).

terpreted arithmetically, this means that the molecule contains at least 48 anhydrocellobiose units. Suggestive and important as this work appears, it requires critical confirmation before we can accept the presence of a carboxyl group, which is none too easy to determine in such small amounts.

It is quite possible that these thread-like molecules, in wood at least, are not invariably of the same length or magnitude, but they are probably always relatively large. These slender molecules, according to Freudenberg's concept, are arranged in bundles forming a thin micelle. The micelles are joined in rows, serving in turn, as the building stones for the fibrillae, which are the architectural materials of the papermaking fiber. In the secondary layer of the cell wall, the micellar rows may actually be imbedded in lignin, which may be crudely compared to reinforced concrete.

The practical papermaker may well ask what the size of the cellulose molecule, the micelle, or a fibril, has to do with pulp manufacture. While no categorical answer can be given, it may be well to point out that the magnitude of the cellulose molecule probably has a marked effect in hydration, in sizing and in drying, and that some day, we hope, it will be correlated with the coloring, tensile strength, durability and moisture retention of paper.

Removal of Lignin from Cellulose

One of the interesting developments of the past two years is the application, in new ways, of a very old means of removing lignin from cellulose. I refer to the use of nitric acid, which according to Krais[13] in his recent literature report, was first used in this connection in 1846. Up to the present, the cost of nitric acid has been prohibitive in pulp making. Recent experiments indicate that for certain raw materials, dilute nitric acid may be used with some assurance of success. The use of 2 to 3 per cent nitric acid, followed by mild alkaline treatment in pulping cornstalks, has been systematically studied by Horvárth and Éber.[14] Their laboratory experiments yielded a strong, easy-bleaching pulp. Important, and as yet unpublished, work on the nitric acid pulping of bagasse has been carried out in the United States by Lynch and Goss of the Bureau of Chemistry and Soils. Kűrschner and Hoffer[15] have based their quantitative determination of cellulose on the use of mixtures of one volume of HNO_3 and four volumes of alcohol. Kűrschner[16] used this same reagent in his fascinating studies of the crystalline nitrolignins.

Over two years ago, Hibbert and his co-workers, Rowley and Marion,[17] pointed out the possibility of removing lignin from spruce wood by the use of ethylene glycol,* and related compounds. Dr. Hibbert's laboratories have made extensive studies of the lignins extracted in this way.[18] Within the past year, Rassow and Wagner[19] have suggested the cautious use of glycol-hydrochloric acid mixtures for the production of a fair grade of pulp, which, despite the fact that its alpha-cellulose content is lower than that of sulphite pulps, deserves further study.

Before leaving the question of delignification, attention should be drawn to an original method suggested by Kleinert and Tayenthal,[20] who obtained good yields of fairly pure cellulose by heating wood for 2 to 3 hours at 180-190 deg. C., with about 50 per cent ethyl alcohol. The lignin which they recovered when the solvent was evaporated appeared unchanged, in other words, it was not ethylated. The pulp contained up to 88 per cent alpha cellulose. Is ethyl alcohol finally to become a raw material even in the paper industry?

Polysaccharides Other Than Cellulose

And now, just a brief mention of the status of polysaccharides other than cellulose which occur in nearly all fibrous raw materials used in papermaking. Of these, the so-called hemicelluloses are insoluble in water, soluble in dilute alkali and readily hydrolyzed by acids, according to the original definitions of Schulze.[21] Only in recent years has it been shown that under the conditions of acid hydrolysis, many hemicelluloses yield not only such sugars as arabinose, galactose, xylose, and mannose, but also certain unstable uronic acids, which are closely related to the sugars, and which, when heated with acids, yield furfural and carbon dioxide. Since furfural is a product regularly obtained from the pentosans and the pentose sugars, it is not surprising that the uronic acid-yielding hemicelluloses, also termed polyuronides, have been confused with the pentosans. At the New Orleans meeting of the American Chemical Society, Hawley and Norman discussed the differentiation of the various hemicelluloses.

Cross and Bevan cellulose, the pulp residue obtained when wood is subjected to delignification by means of chlorine, contains, besides true cellulose, certain hemicelluloses. These are not of the polyuronide type. They give only sugars, on hydrolysis. In the Cross and Bevan cellulose of the cereal straws, hardwoods and bamboo, these hemicelluloses are largely xylans. In the case of softwoods, however, mannans are also present. Hawley and Norman have suggested that these hemicelluloses so closely associated with cellulose proper might be termed cellulosans. Whether or not this nomenclature will be adopted is still an open question. Naturally, cellulosans are present in appreciable amounts in many grades of pulp derived from lignified raw materials. Their presence has a vital bearing on the alpha-cellulose content, and on the subsequent utilization of such pulps. During the past year, some interesting investigations on the nature of these cellulosans and on their quantitative relationship to cellulose have been made, but space will not permit us to summarize their results.

Important Trends in Chemical Research

If the writer were now asked bluntly: "What trends in chemical research having a bearing on the paper in-

[13]Krais, *Papier-Fabr.* 29, no. 23A :71 (June 1931).
[14]Horvárth and Eber, *Cellulosechemie,* 12, no. 4 :85 (1931).
[15]Kürchner and Hoffer, *Chem-Ztg.,* 55, 161 (1931).
[16]Kürschner, *Cellulosechemie,* 12, no. 11 :281 (1931).
[17]Hibbert *et al, Can. J. Research,* 2, 357 (1930). Cf. Fuchs, *Ber.* 62, 2125 (1929), who claims priority for the glycol extraction method.
[18]Hibbert *et al, Can. J. Research,* 5, no. 3 :302 (1931).
[19]Rassow and Wagner, *Wochbl. Papierfabr.,* 62, no. 23A (Sondernummer) 35 (June 6, 1931) and subsequent issues including *ibid.,* 63, no. 13 :243 (Mar. 26, 1932).

[20]Kleinert and Tayenthal, *Z. angew. Chem.,* 44, no. 39 :788 (1931).
[21]Schulze's original definition of the hemicelluloses, *Ber.,* 24, 2285 (1891), etc.

*Glycol is an important industrial material manufactured on a large scale from ethylene gas obtained in the cracking of petroleum. It is used in explosive manufacture and as an antifreeze in automobile radiators. Its derivatives are valuable solvents for the lower cellulose nitrates.

dustry impress you as the most obvious and the most important?" he might hesitate and then reply somewhat as follows:

(1)—More general use is being made of physical instruments of precision, including the spectrometer, the polariscope, the viscosimeter, the refractometer, X-rays, the calorimeter, the polarizing microscope and photomicrographic equipment.

(2)—Older analytical methods are being studied critically and revised. New methods are being inaugurated to keep pace with fundamental investigations.

(3)—Work on the constitution of lignin and cellulose is advancing rapidly. The magnitude of the cellulose molecule, and the relation of this molecule to the submicroscopic structure of the cell wall and to lignin, have been subjected to renewed study.

(4)—Some very old methods for delignification have been revived and quantitatively investigated. New methods for lignin removal are also on the docket.

(5)—A sharper classification based on newer data is being attempted in the case of the hemicelluloses most closely associated with cellulose in wood and in other fibrous materials.

And finally, with some reluctance, the writer would have to admit that his answers are certainly inadequate; that intensive research affecting the pulp and paper industry has extended too far to have its horizons fixed in one brief article.

Prolonging the Life of Fourdrinier Wires

A general analysis of important factors affecting wire life.

THE most important and costliest item which must be periodically replaced on a fourdrinier type paper machine is the wire. Not only is the cost of a wire for a medium sized machine a matter of hundreds of dollars, but the time lost in replacing it means a loss of paper production. For many years, efforts have been made to increase the life of the wire. Different alloys have been tested as well as diverse methods of weaving. Of late, removable fourdrinier parts have decreased the time required for wire installation consequently minimizing lost production time.

It is apparent that the wire not only acts as a continuous driving belt and has a heavy load to carry, but it also acts as a mold on which the sheet is formed. Therefore, it must be made of comparatively light material—fine wire of 60 to 70 meshes to the inch—a delicate structure to perform such an important task. The drag on the wire and tendencies to strain it unnecessarily can be greatly lessened by intelligent and unfailing attention to the mechanical condition of the machine.

Proper lubrication and use of anti-friction bearings are of primary importance, for it has repeatedly been demonstrated that reducing friction of the numerous rolls and moving parts decreases the wear on a fourdrinier wire. Based on the results of many tests, it appears that ball or roller bearings on breast and table rolls are of value. It is likewise important to be certain that the rolls are accurately aligned, that there is not excessive play in any of the bearings, and that the rolls are centered and balanced to rotate evenly.

Proper attention to the rolls carrying the deckle straps to see that they rotate freely will decrease the strain on the edges of a wire, thus keeping the edges in good condition which is essential if satisfactory service is expected from the wire. Recent devices to do away with the use of deckle straps are probably a better solution to this problem. When a machine is equipped so as not to require deckle straps, less time is required to change a wire.

The wire guide may lengthen or shorten the life of a wire, depending on whether or not the guide is functioning properly. If it is sensitive and correctly adjusted, strains or tendencies to run unevenly will be promptly righted. On the other hand, if the guide is neglected and in poor condition, there is a good chance that the wire will not be properly aligned, the edges of the wire may be injured or torn and the wire will give unsatisfactory service requiring premature replacement.

The condition of the drive for the wire is of importance, for it is evident that the relatively delicate wire may be injured by sudden jerks or uneven pulls. Therefore, for starting the machine a smoothly operating clutch is needed. Belts so loose as to cause uneven pulls are also liable to strain the wire. It is good practice to start the wire cautiously at all times rather than to throw in the clutch carelessly and take a chance of putting an unnecessary strain on the wire.

If, due to incorrect adjustment of the stretch roll, the wire is put under undue tension, it will be needlessly stretched and permanently weakened. On the other hand, if the wire is too loose, the slippage of the wire over the suction roll will cause considerable wear due to abrasion as will be further discussed in one of the following paragraphs.

Unbalanced rolls or rolls not properly aligned will cause strain and excessive wear on a wire, for an unbalanced roll will not rotate properly and slippage between the wire and roll will result in abrasion. It is evident that frequent thorough inspection, especially of all rotating parts, will aid in detecting need of adjustment or repair in most cases before serious damage can be done. These precautions are of fundamental importance in increasing the life of fourdrinier wires.

All operators recognize the necessity of extreme care while installing a new wire. Kinks may very easily be forced into the wire and they will practically always develop into cracks—in fact, any mechanical injury

(Continued on page 443)

Control Instruments in Pulp and Paper Making

A review of various types of control instruments and their range of application in pulp and paper mills.

By HARRY E. WESTON*

THE economical production of pulp and paper is dependent in no small way upon the control exercised over process and auxiliary operations. Much of this control is made possible only through the installation of suitably designed instruments and the interpretation and use of their readings.

Among the instruments more or less extensively used for process control purposes within the industry are: CO_2 recorders, gas meters and analyzers, level gauges, pressure gauges pyrometers, steam meters, tachometers, thermometers, vacuum gauges, water meters and weir meters. It would be practically impossible to suggest a complete list of pulp and paper mill applications for each of these instruments. Some of them, because of the purposes for which they are designed, have much broader applications than others due to the peculiarities of the pulp and papermaking processes. The accompanying table, however, is suggestive of their range of application.

CO_2 Recorders

Recorders similar to those used to determine the percentage of CO_2 in the flue gases of steam generating plants to indicate furnace conditions might be employed to check the stack gases of the recovery room of a sulphate or soda mill. These gases arise from the furnace or fire box of a rotary incinerator as well as the incinerator itself in the case of a soda mill; while in sulphate mill recovery the gases arise from the operation of a smelting furnace and the rotary.

The temperature of the hot gases of a soda mill rotary varies greatly. According to Larchar[1] it may range from 900 deg. to 1600 deg. Fahr. This heat is often used in generating steam previous to its discharge to the stack.

The smelting furnace operating at about 2000 deg. Fahr. furnishes the hot gases to reduce the concentrated black liquor of the sulphate process in the rotary furnace to ash. These gases, rich in combustibles, must be supplied with sufficient air in the rotary to complete combustion. Utilization of this heat may be made in the use of disc type evaporators or for generating steam before the gases pass to the stack.

There is a growing tendency to employ spray-in type furnaces in the recovery operations of both soda and sulphate mills in place of the older types of equipment. In such installations, the application of CO_2 recorders would be as essential as in the case already cited in checking the percentage of CO_2 in the stack gases.

In addition to these applications, CO_2 recorders might be helpful in operating lime recovery kilns in both of these processes at their maximum efficiency.

Gas Analyzers and Meters

In the manufacture of sulphite pulp it is necessary to prepare sulphur dioxide gas for use in the production of the cooking acid employed in the process. This gas is produced by burning sulphur in air at a suitable temperature within specially designed burners. The strength of the gas, as produced in common practice, varies from 14 per cent to 18 per cent, the strength depending upon the method of operating the sulphur burners and the method of cooling the gas.

The percentage of SO_2 gas in the gas mixture is commonly determined by means of an Orsat apparatus or it might be automatically recorded by an SO_2 analyzer.

In addition to the analysis of the gas for strength it should be metered before it enters the acid towers where the reaction between the gas, water and limestone or milk of lime forms the so-called sulphite acid of the trade.

Another application of a gas meter in a sulphite mill would include a meter to measure the flow of SO_2 gas from the relief cooler to the recovery or reclaiming tower. This gas, obtained by relieving a digester charge during the cooking operation, is used after cooling to build up the strength of the raw acid produced in the tower or in the milk-of-lime system.

Such measurements would indicate the total quantity of gas produced in the case of the first suggested application, and the total quantity of gas recovered during cooking in the second. Recent statistics indicate that the pulp and paper industry of the United States uses about 250,000 tons of sulphur annually, and that over 1,500,000 tons of sulphite pulp were produced during 1930. It may readily be appreciated from such figures that a knowledge of the SO_2 gas production in any sulphite mill would be of great help in maintaining the greatest possible operating efficiency of the plant.

Level Gauges

Approximately 2,000 gallons of so-called sulphite acid are required per ton of sulphite pulp produced per day. With a production of over 1,500,000 tons of pulp annually or, basing calculations on a 300-day operating year, over 5,000 tons daily, the daily acid requirement for the sulphite mills of the United States would be more than 10,000,000 gallons.

This acid, prepared at each of the various mills, must be stored previous to its utilization in the pulping operations. One typical sulphite mill with a daily productive capacity of 160 tons is using three tanks for acid storage: one with a capacity of 114,000 gallons, the second with a capacity of 96,000 gallons, and the third with a capacity of 80,000 gallons.

The pulp produced in the digesters by the action of the acid and steam under pressure must be washed. Both hot and cold water are used for this purpose. If hot water is used, it would be common practice to utilize a tank for storage. White water, the water obtained from the pulp thickening operations following washing and screening, is also frequently used for pulp washing. In this case, a storage tank would likewise be required.

Pulp handled in slush form, being piped from the pulp mill to the paper mill, would be stored in a large chest for utilization by the paper mill as required. If the mill produced bleached pulp, it would be necessary to include suitable chest equipment for storage of bleached pulp as well as a tank for storing the bleach liquor.

The equipment employed in either a sulphate or soda mill is very similar. Rather than washing pulp in a blow pit, as in the case of the sulphite process, pulp is commonly washed in diffusers or wash pans. Pulp washed in diffusers is discharged into a diffuser chest from which it is pumped to the later operations of the process.

The soda and sulphate processes are both alkaline in character, and each permits a recovery of much of the alkali employed in the pulping operation. Tanks are used in the alkali recovery. One of the comparatively new sulphate mills in the South, with a daily productive capacity of 200 tons, is utilizing four 30-ft. diameter boiler plate steel tanks for black liquor storage, while six 24-ft. diameter tanks are used for green liquor storage. Necessary provision has also been made for storing the white liquor, which is the cooking liquor employed in the process.

Stock chests, hot water tanks, and white water tanks would be used in

*To those who kindly reviewed the manuscript previous to publication thus offering a number of very helpful suggestions, and to those who supplied information, a word of sincere appreciation is extended.—*Author.*

[1] *The Manufacture of Pulp and Paper*, Vol. III.

INSTRUMENTS	APPLICATION	PURPOSE
CO_2 recorders	Soda and Sulphate Mills	
	Liquor and lime recovery	Stack gas analysis
Gas meters and analyzers	Sulphite Mill	
	Burner gas	Measure of SO_2 gas flow and strength to absorption towers
	Relief gas	Measure of SO_2 gas flow and strength to recovery tower
Level gauges	Sulphite Mill	
	Acid storage	Height of material in tank or chest
	Hot water tank	Height of material in tank or chest
	White water tank	Height of material in tank or chest
	Sulphite chest	Height of material in tank or chest
	Screening chest	Height of material in tank or chest
	Bleach liquor storage	Height of material in tank or chest
	Sulphate Mill	
	Diffuser chest or wash pit	Height of material in tank or chest
	Black liquor storage (strong)	Height of material in tank or chest
	Black liquor storage (weak)	Height of material in tank or chest
	Green liquor storage	Height of material in tank or chest
	White liquor storage	Height of material in tank or chest
	Hot water tank	Height of material in tank or chest
	Stock chest	Height of material in tank or chest
	White water tank	Height of material in tank or chest
	Soda Mill	
	Bleach liquor	Height of material in tank or chest
	Other tanks—same as sulphate	Height of material in tank or chest
	Groundwood or Mechanical Pulp Mill	
	Stock chest	Height of material in tank or chest
	White water chest	Height of material in tank or chest
	Paper Mill	
	Prehydrating chest	Height of material in tank or chest
	Beater chest	Height of material in tank or chest
	Machine chest	Height of material in tank or chest
	White water chest	Height of material in tank or chest
	Size storage chest	Height of material in tank or chest
	Clay storage chest	Height of material in tank or chest
Pressure gauges	Sulphite Mill	
	Digesters	Operating pressure of individual digester
	Digester steam main	Steam pressure of main
	Sulphate Mill	
	Digesters	Operating pressure of individual digester
	Digester steam main	Steam pressure of main
	Evaporator—black liquor	Steam pressure to evaporator
	Soda Mill	
	Digesters	Operating pressure of individual digester
	Digester steam main	Steam pressure of main
	Evaporator—black liquor	Steam pressure to evaporator
	Groundwood or Mechanical Pulp Mill	
	Grinders	Operating pressure of grinding
	Paper Mill	
	Steam header—Paper Machine Dryer Section	Steam pressure in header
	Low pressure header—Paper Machine Dryer Section	Steam pressure in header
	Return or condensate header—Paper Machine Dryer Section	Steam pressure in header
Pyrometers	Sulphite Mill	
	Combustion chamber	Temperature in chamber
	Sulphate Mill	
	Smelting furnace	Temperature in smelting furnace
	Lime kiln	Temperature in lime kiln
	Soda Mill	
	Lime kiln	Temperature in lime kiln
	Paper Mill	
	Dryers, paper machine	Temperature of individual dryers obtained with portable pyrometer
Sampling devices—continuous	Sulphite Mill, Sulphate Mill, Soda Mill, Groundwood Mill and Paper Mill	To sample white water discharge to sewer continuously permitting analysis of water for losses
Steam meters	Sulphite Mill	
	Digesters	Measure of steam flow to each digester
	Pulp Dryer	Quantity of steam required for drying
	Pulp wood vat (used in winter to defrost and clean wood)	Quantity of steam required to heat water
	Sulphate Mill	
	Digesters	Measure of steam flow to each digester
	Pulp dryer	Quantity of steam required for drying
	Causticizing tanks	Quantity of steam required for causticizing
	Evaporator—vacuum	Quantity of steam supplied to evaporators
	Soda Mill	
	Digesters	Measure of steam flow to each digester
	Pulp dryer	Quantity of steam required for drying
	Causticizing tanks	Quantity of steam required for causticizing
	Evaporator—vacuum	Quantity of steam supplied to evaporators
	Paper Mill	
	Dryers (paper machine)	Quantity of steam required for drying
	Beaters	Quantity of steam supplied to beaters
Tachometers	Paper Mill	
	Paper machines	Measure of paper machine speed
Thermometers	Groundwood or Mechanical Pulp Mill	
	Grinder pit	Temperature of stock in pit
	Sulphite Mill	
	Accumulator, acid (Chemipulp)	Temperature of stored acid
	Cooler, SO_2 gas	Temperature of cooled gas and temperature of inflowing cooling water and outflowing water

INSTRUMENTS	APPLICATION	PURPOSE
Thermometers —continued	Cooler, SO_2 relief gas	Temperature of cooled gas and temperature of inflowing cooling water and outflowing water
	Digesters	Temperature of digester charge during pulping or cooking operation
	Storage, acid	Temperature of cooking acid
	Towers, acid	Temperature of water used to produce acid
	Towers, reclaiming	Temperature of raw acid Temperature of final acid to storage Temperature of relief gas to towers
	Sulphate Mill	
	Digesters	Temperature of each digester charge during cooking cycles
	Evaporators	Temperature of live steam used for evaporation Temperature of inflowing and outflowing concentrated black liquor
	Tanks, causticizing	Temperature of causticizing operation
	Soda Mill	
	Digesters	Temperature of each digester charge during cooking cycles
	Evaporators	Temperature of live steam used for evaporation Temperature of inflowing and outflowing concentrated black liquor
	Tanks, causticizing	Temperature of causticizing operation
	Paper Mill	
	Beaters	Temperature of stock during process of beating
	Jordans	Temperature of stock immediately before and after jordaning
Vacuum gauges	Sulphite Mill	
	Acid system (Milk-of-Lime)	Inches of vacuum in towers when operated under vacuum rather than pressure
	Wet machines	Inches of vacuum in flat boxes of machines
	Vacuum pulp washers	Inches of vacuum
	Vacuum filters	Inches of vacuum
	Sulphate Mill	
	Evaporators, vacuum	Inches of vacuum in each effect
	Wet machines	Inches of vacuum in flat boxes of machines
	Vacuum pulp washers	Inches of vacuum
	Vacuum filters	Inches of vacuum
	Soda Mill	
	Evaporators, vacuum	Inches of vacuum in each effect
	Wet machines	Inches of vacuum in flat boxes of machines
	Vacuum pulp washers	Inches of vacuum
	Vacuum filters	Inches of vacuum
	Groundwood or Mechanical Pulp Mill	
	Wet machines	Inches of vacuum in flat boxes of machines
	Paper Mill	
	Paper Machines	
	Boxes, flat	Inches of vacuum in flat boxes of machines
	Conditioners, felt	Inches of vacuum in boxes used for felt conditioning
	Rolls, suction—couch and press	Inches of vacuum maintained on suction couch and suction press rolls
	Dryers—Minton Vacuum	Inches of vacuum maintained in dryer section
Water meters	Sulphite Mill	
	Towers, acid	Quantity used for acid production
	Coolers, SO_2 gas	Quantity used to cool gas
	Coolers, SO_2 relief	Quantity used to cool gas
	Blow pits	Quantity used to wash pulp
	Screens, pulp	Quantity used to put stock in condition for screening
	Mill supply	Quantity for entire mill
	Bleaching equipment	Quantity used to prepare bleach liquor and to wash bleached pulp
	Sulphate Mill	
	Diffusers and wash pits	Quantity used to wash pulp
	Screens, pulp	Quantity used to put stock in condition for screening
	Liquor preparation	Quantity used in the recovery and liquor preparing plant
	Bleaching equipment	Quantity used to prepare bleach liquor and to wash bleached pulp
	Mill supply	Quantity for entire mill
	Soda Mill	
	Wash pits	Quantity used to wash pulp
	Screens, pulp	Quantity used to put stock in condition for screening
	Liquor preparation	Quantity used in the recovery and liquor preparing plant
	Bleaching equipment	Quantity used to prepare bleach liquor and to wash bleached pulp
	Mill supply	Quantity for entire mill
	Groundwood or Mechanical Pulp Mill	
	Grinders	Quantity used for grinding
	Screens, pulp	Quantity used to put stock in shape for screening
	Mill supply	Quantity for entire mill
	Paper Mill	
	Beaters	Quantity used to fill beaters
	Jordans	Quantity added to stock after beating but previous to Jordaning
	Screens, paper	Quantity added to Jordan stock to put it in shape for screening and paper fabrication
	Showers—paper machine	Quantity used for wire cleaning and felt cleaning
	Mill supply	Quantity for entire mill
Weir meters	Sulphite Mill	
	Sewer line	Quantity or mill effluent to sewer
	Sulphate Mill	
	Evaporators	Quantity of black liquor fed to evaporators
	Digesters	Quantity of cooking liquor per charge
	Sewer line	Quantity of mill effluent to sewer
	Soda Mill	
	Evaporators	Quantity of black liquor fed to evaporators
	Digesters	Quantity of cooking liquor per charge
	Sewer line	Quantity of mill effluent to sewer
	Groundwood or Mechanical Pulp Mill	
	Sewer line	Quantity of mill effluent to sewer
	Paper Mill	Quantity of white water to sewer

these processes for the same purposes as in the sulphite process.

Soda pulp is commonly bleached since it is commonly utilized in the production of book papers in conjunction with bleached sulphite stock and perhaps deinked and bleached old magazine stock. The bleaching of the pulp would necessitate the use of bleached stock chests as well as suitable bleach liquor storage.

Although only a small percentage of the total production of sulphate pulp is bleached at present, the trend indicates an increased tonnage of the bleached fiber. Sulphate mills that bleach their pulp will naturally be equipped with suitable chests, as in the case of sulphite and soda mills, for storing the bleached pulp in process as well as for storing bleach liquor.

Stock chests and white water chests, as in the case of sulphite, soda, and sulphate mills, are also standard equipment in groundwood or mechanical pulp mills.

Many tanks are also employed in the conversion of pulp to paper. Briefly, the most important tanks of a typical paper mill would include prehydrating chests, beater chests, machine chests, white water chests, size storage tanks, alum storage tanks, and clay storage tanks. Details in the design of each of these chests would vary with the individual mill, the nature of the final product, the capacity of the plant, etc.

Prehydrating chests, at least in name, are rather new to the paper industry. Where prehydrators are used, the stock is agitated in specially designed chests for a number of hours before charging the beaters with it. Some of these chests are sufficiently large to contain approximately an entire day's supply of stock. The stock after beating is stored in beater chests from which it is commonly pumped through the jordans and to storage in the machine chests.

In the fabrication of a sheet of paper on a paper machine, it is necessary to remove a tremendous quantity of water from the fibers in suspension. This water, designated as white water, is frequently reused in the papermaking process. This reuse of the white water necessitates suitable storage in the form of white water chests.

Size and alum are used in sizing most of the common grades of paper. In some cases, no provision is made in the mill for tank storage of these materials in solution. However, many of the mills are equipped with tanks that are employed for this purpose. The use of the tanks permits closer control of the sizing operation.

Large quantities of clay are used by some mills. This clay, prepared at the mill in the form of milk, is stored in tanks, as in the case of rosin and alum.

Although a complete survey of the industry would reveal many other uses for tanks, the applications already suggested are indicative of the wide variety of tank installations required by the field.

In all cases, the use of instruments for indicating or recording the contents of the various tanks would permit more efficient control of process operations. It is simply a question of having instruments designed to meet the needs of the individual jobs.

Pressure Gauges

In the production of chemical pulp it is necessary to treat the wood in contact with the cooking liquor (acid or alkaline) under pressure. This operation is performed in pressure vessels commonly designated in the trade as digesters.

The progress of the cooking operation depends on a number of factors, one of which is digester pressure. In the case of sulphite digester operation, the maximum pressure employed for pulping varies somewhat with the individual mill, but on an average probably approximates 75 lb. A somewhat higher pressure, 100-125 lb., is used for the digestion operation in soda and sulphate pulping.

Statistics[2] indicate that there were 727 digesters in use among the chemical pulp mills of the United States during 1929. Of this number, 385 were installed for sulphite pulp production, 198 for soda pulp and 144 for sulphate pulp.

Each of these digesters must be equipped with suitably designed pressure instruments. At the same time, pressure instruments should be installed in the steam mains leading to the digester installation of the individual plant.

In addition to the installation of pressure gauges on digesters and pressure mains leading to them, pressure gauges should likewise be installed for determination of pressure of steam used for heating vacuum multiple effect evaporators. Such evaporators are used in the alkali recovery operations of both soda and sulphate mills.

In a groundwood mill, it is essential that pressure gauges be used on each pulp grinder to show the pressure employed for grinding. The pressure required for this operation varies considerably and under ordinary conditions will range from 60 to 125 lb. per square inch.

In the paper mill, the major applications for pressure gauges are probably associated with the various types of paper machines. Steam in large quantities is required for drying the sheet of paper in process of formation, and it is naturally essential that the pressure in the several steam headers of a paper machine dryer section be known. Insufficient pressure in the dryers proper would probably result in underdried paper, while excess pressure might actually develop a serious accident hazard.

Some pulp mills are equipped with pulp drying machines. The dry end of such a machine is very similar to the dry end of the paper machine and would have the same possible applications for pressure gauges.

In addition to the applications for pressure gauges that have already been suggested are numerous applications for hot and cold water lines and for compressed air lines, each of which are common to most mills.

[2] *Census of Manufactures*—Paper and Allied Products (1929).

Pyrometers

As a whole, the industry does not offer a wide number of applications for pyrometers. Probably the most important applications would include the combustion chamber of sulphite acid plants, rotary lime kilns of soda and sulphate recovery plants and for smelting furnaces of sulphate mills.

The temperature of the SO_2 gas as it leaves the combustion chamber, a chamber used in conjunction with the sulphur burner to aid in preventing sublimation by completely oxidizing the sulphur, is usually from 700 deg. to 900 deg. C. This temperature is extremely important and must be maintained until a rapid cooling of the gas is possible in order to avoid the formation of any large amount of SO_3. A recording pyrometer is commonly used for ascertaining the temperature of the gas at this point.

In the soda and sulphate processes, it is essential, as previously stated, to recover the alkali in the used liquor of the digestion operation. In making this recovery, lime is employed and a lime sludge or calcium carbonate precipitate formed.

A number of the mills have installed rotary lime kilns to permit the conversion of the sludge to lime rather than leaving the sludge as a waste material. Such lime is reutilized in the recovery operations. Pyrometer installations on such kilns permit better control of the calcining or burning operation.

Smelting furnaces used in the recovery operations of a sulphate mill to oxidize the carbon in the black ash and to reduce the salt cake (the raw material added to make up for the loss of alkali in the cooking cycle) to sodium sulphide, as well as furnishing heat to the rotary incinerators that produce the black ash, operate at high temperatures. A smelter is commonly operated around 2000 deg. Fahr. The mixture of black ash and salt cake does not seem to smelt below 1700 deg. Fahr., and should the temperature exceed 2200 deg. Fahr., it is very hard on the furnace linings. A pyrometer installation on a smelting furnace makes it possible to control the temperature within the desired range.

The temperature of paper machine dryer surfaces is frequently ascertained by the use of a portable pyrometer. Such readings permit the observer to locate any dryer or dryers that may not be functioning properly in so far as heat transfer is concerned.

Sampling Devices—Continuous

A continuous sampling of white water or sewer effluent in both pulp and paper mills is essential in ascertaining losses. The continuous sampling of the effluent makes it possible, knowing the flow, to determine quite accurately the loss of fiber and other materials to the sewer. Results obtained through continuous sampling are tell-tales of operating conditions.

The annual fiber white water loss to the industry that should be recovered and utilized, according to a survey made by the engineer of the American Paper and Pulp Association in 1927, amounts to something between six and seven million dollars.[3] Bearce[4] states that the estimated average loss throughout the industry for different grades of paper is approximately as follows: Wrapping, 5 per cent; news, 7 per cent; tissue, 10 per cent; board, 10 per cent, and book, 15 per cent.

Although much has been done by equipment manufacturers and mill operators in studying this problem, there is yet much to be accomplished. One of the best ways for a mill to appreciate its white water losses is to know definitely what are the losses. This information, as previously stated, can be determined through the use of suitably designed instruments to measure its flow and instruments to sample the flow continuously.

Steam Meters

One of the most important items of cost in chemical pulp and paper manufacture is steam. The process requirements are very large. Among the chemical pulp mill process operations requiring large quantities of steam are digestion of wood chips, evaporation of black liquor in soda and sulphate mill recovery operations, causticizing or treatment of green liquor with lime in the production of the cooking liquors in both the soda and sulphate processes, and in bleaching.

The quantity of steam required for digesting the wood in each of the various chemical pulp processes varies considerably. Calculations by Andrews[5] show that a 14 ft. x 47 ft. sulphite digester of about 16 cords capacity of rossed wood requires about 60,000 lb. of steam per cook. Dr. Bjarne Johnsen[6] suggests that 5000 to 5500 lbs. of steam per ton of sulphite pulp is the probable consumption in most mills. Sutermeister[7] states that the average total in pounds of steam required for a 15-cord soda pulp digester, based on a long series of observations, ranges from 24,200 lb. to 39,700 lb. In the case of sulphate pulp, Thorsen[8] states that about 9000 lbs. of steam are required to cook one ton of pulp, while from unpublished data available records indicate a steam requirement of approximately 4700 lb. for indirect cooking and 4900 lb. for direct cooking.

The concentration of soda and sulphate black liquor to permit recovery of the alkali is effected through the use of evaporators. Multiple-effect vacuum evaporators are commonly installed for this service.

The steam requirements for evaporation in pounds per ton of pulp vary with individual mills because of differences in practice. Probably 3000-4000 lb. of steam per ton of sulphate pulp, with steam at 20-25 lb. pressure, would be an average figure for concentrating black liquor from about 9 deg. Bé. to 45 per cent solids in a quadruple-effect evaporator, while 7000-8000 lb. of steam would be required for evaporation of black liquor per ton of soda pulp in a similar evaporator installation. It should be suggested that the volume of black liquor per ton of sulphate pulp ranges from about 1500 to 2000 gallons, while about 3000 gallons of black liquor would probably be an average per ton of soda pulp.

The causticizing in case of both soda and sulphate mills is carried out at a temperature of 85 deg. to 95 deg. C. Although the temperature is low, the volume of liquor that must be raised to this temperature is so large that considerable steam is required in the operation. Results of tests[9] made a number of years ago in an alkali plant using the open pan or batch method for causticizing, showed a steam consumption of approximately three pounds at 95 lb. gauge pressure per cubic foot of pan operation; in other words, three pounds per cubic foot of combined causticized liquor and sludge prior to decantation. Although such a method of causticizing is in general characteristic of the parallel operation in both soda and sulphate mills, it is believed that this figure is somewhat lower than would be obtained in the average pulp mill operation. Steam requirements for well-jacketed continuous causticizers are much less than in the batch method. It has been suggested that six-tenths of a pound of steam per foot of operation area may be sufficient for such a causticizer when properly operated.

Although the amount of steam required for bleaching is considerably less than for digestion, evaporation or liquor preparation, it is, nevertheless, an important item in pulp costs.

The drying of paper is the outstanding process operation in the paper mill requiring large quantities of steam. It should be emphasized that under ordinary operating conditions three to five pounds of steam are required for each pound of paper produced, for the drying operation alone.

With a production of over 10,000,000 tons of paper annually, it is not difficult to appreciate the value of metering steam to paper machines.

There are, in addition to the machines used for producing paper, a number of pulp-drying machines. The dryer sections of these machines are fundamentally the same in design as paper-machine dryers and require steam for drying.

Tachometers

The most outstanding application for tachometers that is offered by the pulp and paper industry is probably that of the paper machine, an application in which most mills are interested.

Such an instrument on a paper machine should not only indicate the paper machine speed, but should record the speed in feet per minute and should show any speed fluctuations as well as shutdowns and the duration of such periods. This information is of unusual importance as the speed of operation is an indication of both quantity and quality of production. The records of such a tachometer also permit, at changes in shifts, the on-coming crew to see at a glance what the machine has been doing during the previous shift, as it gives a reliable and complete record of performance.

Statistics[10] for 1929, indicate there were at that time 937 fourdrinier and 738 cylinder papermaking machines in the United States. Each of these machines should be equipped with a suitably designed tachometer.

It would also be helpful if tachometers were more widely used on other process equipment. Some machines, due to the nature of the work which they perform and conditions under which they operate, must be shut-down at intervals. A chipper must be stopped to file the knives, or to remove a dull set and insert sharp ones. The time interval between shut-downs as well as the duration of shut-downs would be recorded easily by a suitably designed instrument. The same condition would apply to any disc barker installation. Such information as revealed by instrument charts on such machines would indicate clearly the condition of the wood being barked or chipped.

One of the factors, at least, influencing the character of the pulp produced by a wood pulp grinder is the peripheral speed of the stone. The speed of the stone varies in different mills but will ordinarily range from 200 to 260 r.p.m. The installation of a tachometer on each grinding unit along with other necessary instruments of control makes it possible to operate the grinders most efficiently and also permits the compilation of valuable operating data which can be used in charting future operations.

Without doubt there are numerous other applications for recording tachometers within the industry, where perhaps the results of the application would not be so tangible but would, nevertheless, supply highly desirable information. Two applications that suggest themselves are for slitters and rewinders, and for supercalenders.

Conditions in a plant often make it necessary to check the speed of a shaft or of a machine that is not equipped with a tachometer. There would be no end to cases of this kind. For such readings, a portable tachometer would be used. These instruments are designed for easy handling and they commonly read in revolutions per minute. A recent development by one of the instrument manufacturers includes a design of portable tachometer by which readings in feet per minute may be obtained if desirable.

[3] *Technical Association Papers* (1931).

[4] G. D. Bearce, *Technical Association Papers and Reports* (1926), Report of Committee on Waste.

[5] Andrews, *Paper* (Feb. 20, 1918).

[6] *The Manufacture of Pulp and Paper*, Vol. III.

[7] Sutermeister, *Chemistry of Pulp and Paper Making*.

[8] *The Manufacture of Pulp and Paper*, Vol. III.

[9] Private communication.

[10] *Census of Manufactures*—Paper and Allied Products (1929).

Thermometers

Temperature control of a number of process operations in pulp and papermaking is of fundamental importance.

A number of points where temperature control is helpful are indicated in the previously presented table. A careful study of the table will reveal the wide variety of these operations and indicate the purpose of each application.

In the grinding of wood for mechanical pulp, the volume of cooling water used is regulated to give a temperature of 130 deg. to 190 deg. Fahr. to the pulp in the pits. A control of this temperature is one of the important operations in the production of a uniform quality of groundwood.

Although the Chemipulp process is a comparatively new development in the sulphite pulp industry, it has already been installed in a number of mills. It is simply a method of recovering hot SO_2 gas and liquor under pressure and supplying the cooking acid to the digesters at a high initial temperature. The temperature is approximately 80 deg. C. while the pressure under which the hot acid is supplied to the digesters is about 40 lb.

Regular and uniform cooling of the SO_2 burner gas is very important in the production of a satisfactory sulphite cooking acid. Some mills have a poor water supply for cooling, particularly during the summer months. In other cases mills have drilled deep wells to furnish the necessary cooling water with subsequent beneficial results. As an average figure probably 55 deg. Fahr. might be given as the temperature to which the burner gas should be cooled. It is also important to control the temperature of the SO_2 relief gas, the gas used to build up the strength of the raw cooking acid.

Satisfactory operation of sulphite digesters could not be obtained without temperature and pressure control. In the quick cooking of sulphite pulp, an operation requiring eight to twelve hours, the maximum temperature during the cook will range from about 140 deg. to 160 deg. C., depending upon the practice of the individual mill, while the pressure, as previously mentioned, will probably average 75 lb.

With the temperature of the SO_2 burner gas playing such an important part in the production of a satisfactory cooking acid, it is easy to appreciate the value of temperature readings for water used to produce acid, for the raw acid, for relief gas to reclaiming tower, for final acid to storage and for final acid in storage.

In the soda and sulphate industry, temperature control of digester operation through the use of thermometers is just as important as in sulphite cooking. Temperature readings are vitally important if quality pulp is to be produced.

Other operations in soda and sulphate mills where temperature control is important include evaporation of black liquor and causticizing. In the case of evaporation, it is essential that the temperature of the inflowing black liquor to the evaporator be known, as well as the outflowing concentrated liquor and the temperature of the steam used for heating.

It was mentioned previously that the causticizing operation in both soda and sulphate mills is carried out at a temperature of 85 deg. to 95 deg. C. Temperature control of this operation is essential; in fact, one authority in this field suggests that probably three-fourths of the difficulties encountered in the caustic room are due to faulty temperature control.[11]

The paper mill does not offer the wide variety of applications for thermometers as does the chemical pulp mill. Nevertheless, there are several applications that are important. In some mills, a knowledge of temperature conditions of the stock in process of beating is important; while it is believed that in all mills the temperature of stock immediately before and after jordaning should be known at all times.

Vacuum Gauges

Some of the sulphite pulp mills manufacturing their cooking acid in a milk-of-lime system, operate the absorption towers under partial vacuum rather than under pressure. In such cases, the gas is pulled through the system under a vacuum equal to about nine inches of mercury. An instrument to indicate this condition is essential in the operation of the system.

Other equipment in the wood pulp industry upon which vacuum gauges of some kind are essential to their operation includes wet machines, vacuum pulp washers, filters, and save-alls, and vacuum evaporators.

Wet machines are generally used in mills that are manufacturing pulp for shipment or for storage. Such machines are designed to remove water from the screened stock and to form the pulp fibers into thick sheets which can be folded or left flat for easy handling. To increase the water removal from the sheet, it is often found advantageous to use a flat box or vacuum box under the felt, the medium which acts as a water filter and as a conveyor of pulp fibers in sheet form. Every box of this kind should be equipped with a suitable vacuum gauge to indicate the number of inches of vacuum under which the box operates.

Vacuum filters are sometimes used in place of wet machines. Similar machines are also used for chemical pulp washing, for save-alls, and for the recovery or thickening of lime sludge produced in the causticizing operation of soda and sulphate liquor preparation. It goes without saying that such equipment requires some type of vacuum gauge for indicating the conditions of operation.

In like manner, multiple effect evaporators are operated under partial vacuum in the concentration of black liquor in the recovery operations of soda and sulphate mills. Such evaporators are often supplied with steam under 10 to 40 lb. pressure for heating one effect, and operate under approximately 26 inches of vacuum in the last effect.

In the paper mill, the paper machine offers most of the applications for vacuum gauges. These applications include use on flat boxes of the wet end of fourdrinier machines, and on the suction rolls, couch and press of similar machines, as well as suction rolls on cylinder machines and suction boxes of felt conditioners.

The vacuum applied to the flat boxes of fourdrinier machines approximates seven to ten inches of mercury; fifteen inches would be an average for suction rolls, while 3½ to 4½ inches would probably be a fair average for felt conditioners.

The dryer section of some paper machines, as well as some pulp drying machines, utilizes a Minton vacuum dryer. In such cases, the dryer sections must be equipped with suitable control gauges.

The most commonly used gauge is of the straight mercury column type which is graduated from 0 in. to 31 in. and is provided with a moisture catch basin. Mercury absolute pressure gauges have been used in several instances. Usually several spring gauges are also installed at various points in a section to serve as a guide to operators, but are not used to establish the actual vacuum maintained.

The vacuum or even pressure on such dryers can be varied, according to Ogden Minton,[12] to give drying temperatures ranging from 85 deg. Fahr. up to an even over 212 deg. Fahr. A pulp dryer installation[13] in one of the new mills on the Pacific Coast operates under 28 inches of vacuum.

Water Meters

It would be impossible to overemphasize the importance of water to the pulp and paper manufacturing industry. In fact, it is doubtful if there is a single economic factor so important to the satisfactory location of a pulp and papermaking enterprise as water supply.

Engineers in locating a pulp and paper plant commonly estimate the water requirements at about 50,000 gallons per ton of mechanical pulp, 75,000 gallons per ton of unbleached sulphite, 100,000 gallons per ton of bleached sulphite, 100,000 gallons per ton of soda pulp, 75,000 gallons per ton of sulphate pulp, and 30,000 to 40,000 gallons per ton of paper. Although it is doubtful if any two mills, even with the same productive capacity, would use exactly the same quantity of water, as so much depends upon the product being manufactured and the practice of the individual plant, such figures are indicative of the importance of water to the industry. This importance may be more fully appreciated by suggesting that the estimated production of mechanical pulp in the United States during 1930 was 4,610,408 tons, while 1,515,795 tons of sulphite, 952,282 tons of sulphate, 504,-

[11] Private communication.

[12] *Technical Association Papers* (1931).

[13] THE PAPER INDUSTRY (Jan., 1932), New Weyerhaeuser Pulp Mill.

229 tons of soda, 30,213 tons of semi-chemical, and 49,068 tons of screenings were produced during the same period. In addition to this pulp production, was the production of 10,079,656 tons of paper.

A few of the most important uses of water, exclusive of its use in the development of both electrical energy and steam, would include cooking liquor preparation: sulphite, soda, and sulphate; wood grinding; washing of pulp; screening of pulp; bleaching of pulp; beating and refining or preparation of paper stock; screening of paper stock; and for conditioning of felts and wires of paper machines.

Water is used in so many ways in a pulp and paper mill that it is frequently wasted. Although most of the mills do not buy their water, it must be pumped and pumping requires power. Power costs money and the only way to check on unnecessary power costs in so far as the pumping of water is concerned is to meter the water.

Weir Meters

A few of the most important applications for weir meters that might be suggested would be for measuring the quantity of black liquor passing to evaporators in both the soda and sulphate processes; the cooking liquor requirements per digester charge for sulphite, soda, and sulphate; for bleach liquor measurement; and for white water measurement from process operations going to the sewer.

Other Control Instruments

A number of control instruments other than those already mentioned also find use among pulp and paper mills. A few of the instruments that might be mentioned would include specific gravity meters, pH recorders, conductivity recorders, condensation meters, hygrometers or psychrometers, indicating and recording micrometers, and moisture indicators and recorders.

A specific gravity recorder or conductivity recorder that will record the concentration of black liquor going from the wash pans or diffusers to storage will permit better control over the washing operation and likewise save steam in the evaporator room of both soda and sulphate mills. The concentration of alum to the stock in the beaters is sometimes regulated by a conductivity recorder or by a pH recorder controller. At the same time, the conductivity recorder may be recommended to determine the conductivity of evaporator condensate. Such an instrument will give a continuous record of entrainment losses in this equipment.

Condensation meters applied to the measuring of hot condensate from paper machine dryers would give the machine operator definite information on the condition within the dryers. Instruments to record both temperature and humidity conditions within certain departments of a mill are likewise important. These instruments can be advantageously used in machine rooms, loft drying rooms, grinder rooms, and paper storage rooms.

Two factors of utmost importance in the manufacture of paper are weight and thickness. Although both of these factors are commonly controlled within narrow limits, through proper regulation of the consistence of the stock as it enters the paper machine, it would be advantageous to know continuously the thickness of the paper as produced by the machine. Both indicating and recording devices have been developed to make it possible to obtain such readings. The use of these instruments should be of great help to the operating staff through minimizing delay in making necessary adjustments. In any event, the recording micrometer or thickness gauge would give a record of the thickness of the paper being produced at all times.

Similarly, it is possible to obtain a graphic record of the moisture content of the running sheet through the use of a moisture recording instrument. The moisture content of stacked or piled sheets may be obtained with a moisture indicator.

No mention has been made to the wide use for ammeters, wattmeters, volt meters, etc., or such instruments as might be employed for electrical control or for steam generation. This subject is a broad one in itself and cannot be discussed at this time.

Care of Instruments

Every production executive realizes the necessity of proper maintenance of process equipment. Shutdowns are expensive and everything is done to reduce them to a minimum. It is believed that this same thought does not always obtain in regard to instruments of control.

An extensive installation of instruments might be made to permit more accurate standardization of process operations and, at the same time, the production of a more uniform product, only to forget that these instruments, or a portion of them at least, require any care. Most of the instruments used are of sturdy design and are made fool-proof as far as possible. Nevertheless, even the best of them require attention from time to time.

One important instrument manufacturer, and without doubt a number of others, in instances where the number of installed instruments justifies the investment, arranges a maintenance service with the customer. Such service includes a thorough inspection of the instruments in question by a service engineer. The engineer makes his inspections at regular intervals and submits a report covering the condition and care of the instruments. He also makes any minor adjustments that seem necessary. In this way the instruments are kept in best possible condition and make for most efficient use of data which they present.

In some instances, it has been found advantageous for a mill to place one of its own men in complete charge of all instruments. It is believed in such cases that an instrument manufacturer would be pleased to supply an instructor for a period sufficiently long to train such an individual for the job. Such an arrangement makes it possible to delegate responsibility and aids in giving proper care to the instruments. Through frequent contacts with all of them the trained individual is in position to detect quickly any unit that may be functioning improperly and take necessary steps to correct the difficulty.

It should be borne in mind that all instruments should be designed for the duty in which they are to function. Instruments have sometimes been condemned and thrown out of service, not because of poor design, but rather because of poor application. The instrument manufacturer, as well as the user, should be satisfied in each case that the instrument is the proper one for the job before making the installation. Any unusual conditions under which the instrument must function should be considered and analyzed so that an instrument might be chosen to meet the requirements as fully as possible. It is only with such consideration that most efficient service can be expected.

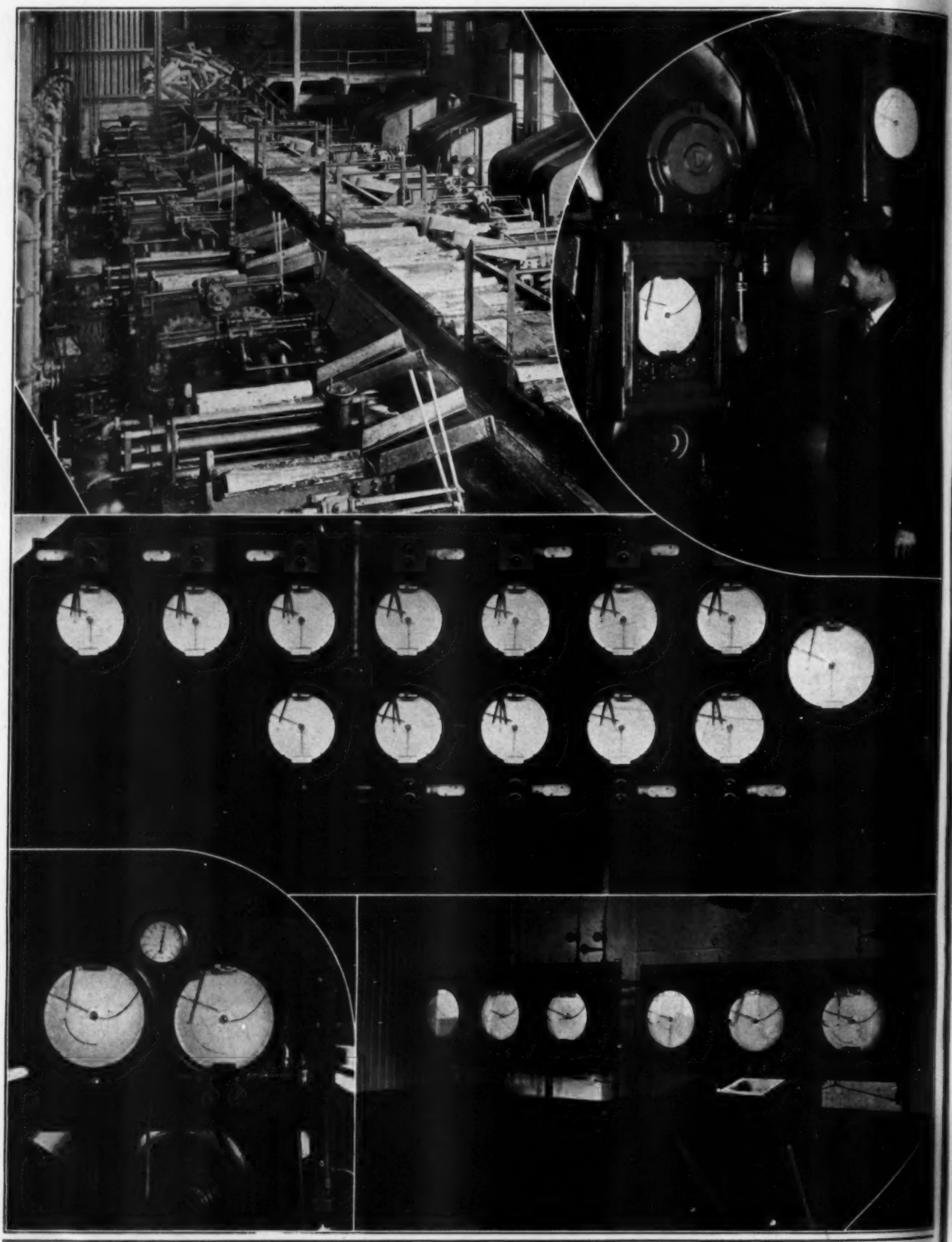
Might it be further suggested that an individual record from a recording instrument means very little other than to inform those in charge of plant operation of conditions for the period covered by the chart. Sometimes this information is particularly important because of some unusual plant condition, but of even greater importance is the sum total of all information that can be obtained from a study of a number of these charts obtained over a period of time.

These charts would reveal fluctuations in plant practice from day to day, week to week, month to month or year to year. Such information is lost if the records as removed from the instruments are discarded or, perhaps, filed with no thought of further reference.

Then it is possible to compare charts from one operation with charts of another with equally beneficial results. In this way, the less efficient operations may be improved and the entire scope of operations enhanced.

There have been many improvements in pulp and papermaking processes and in process equipment during recent years. Equipment manufacturers have been on the alert to improve the design of process and auxiliary equipment. Technologists have been anxious to improve the processes of manufacture. The result has been an enhancement of technical knowledge that is little short of marvelous.

It may be said that the day of guesswork in pulp and paper making is gradually passing. Such instruments as have been mentioned and a number of others have contributed their part in making this possible. Naturally better control of process operations tends toward a better uniformity in product with lower cost—the goal of every ambitious papermaker.



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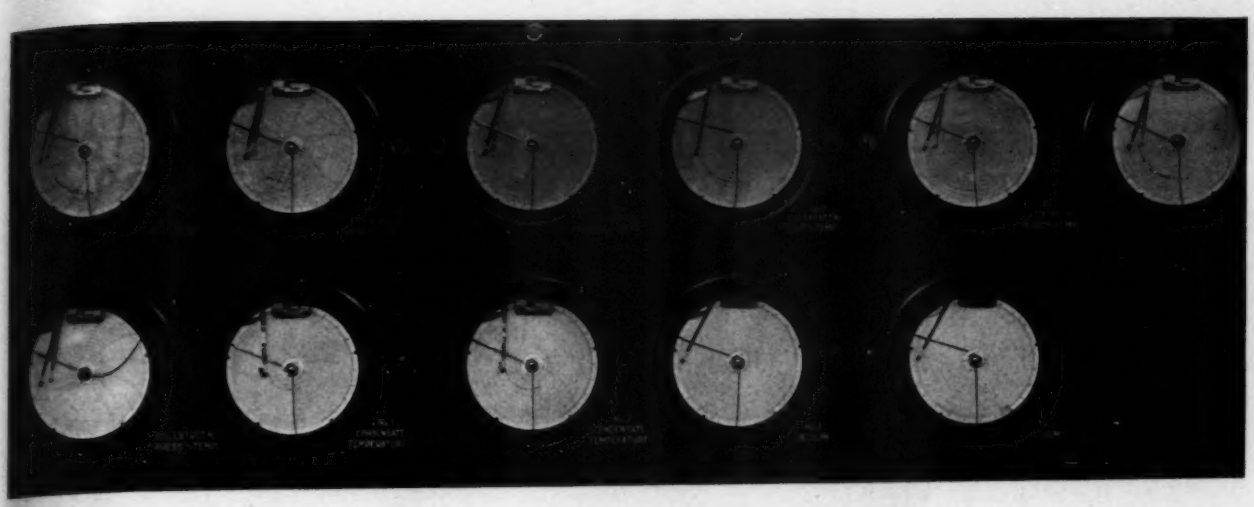

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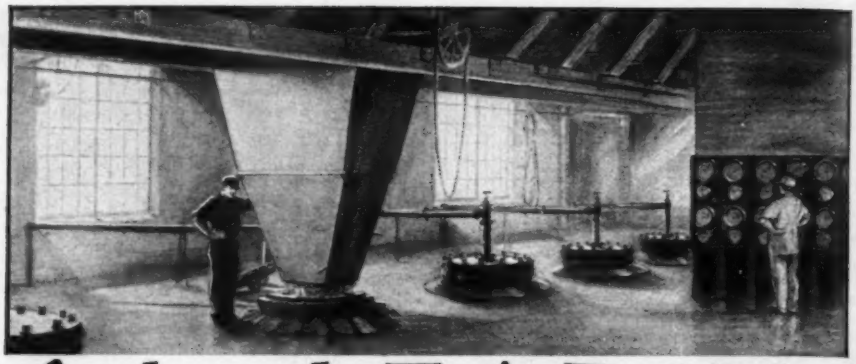

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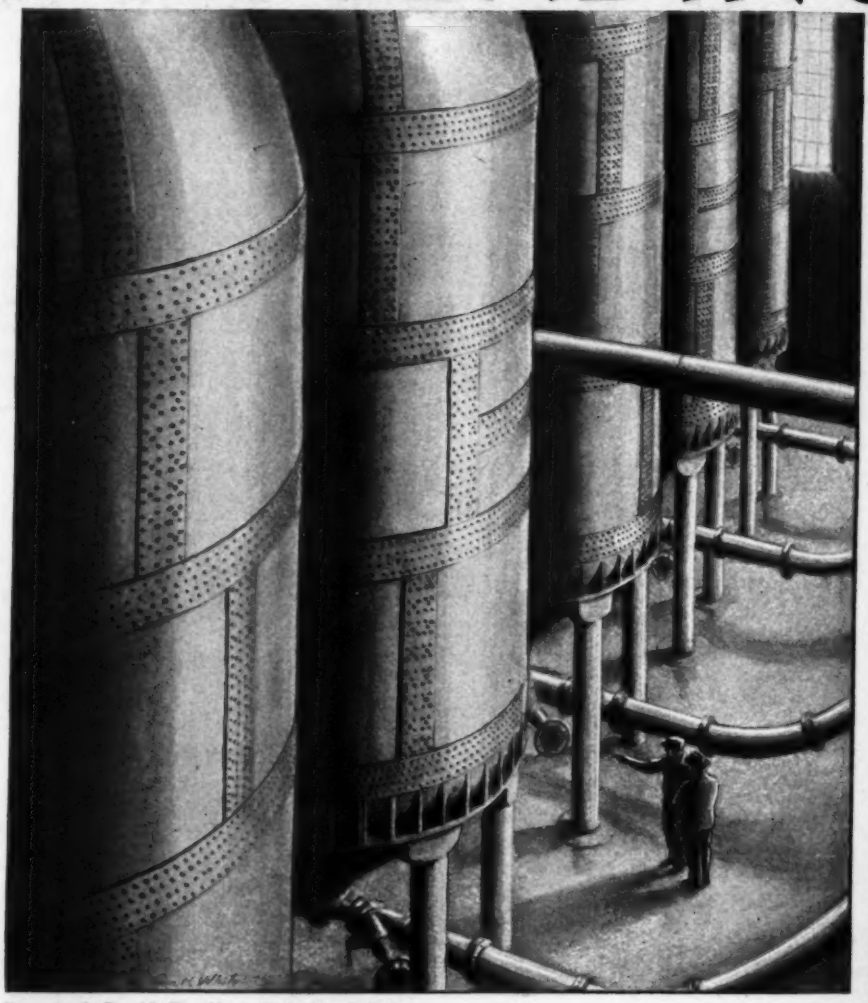

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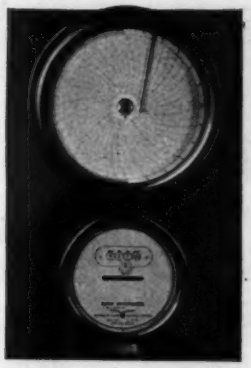

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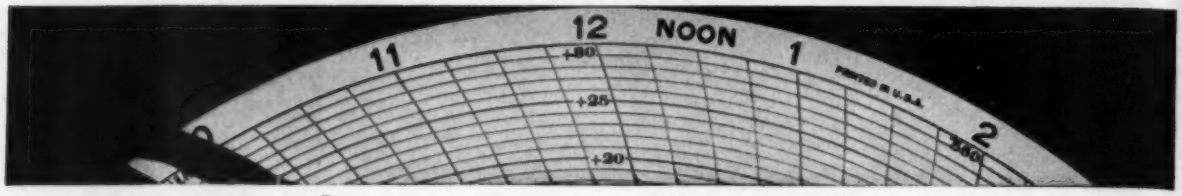

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Uses of Wood in Equipment Construction

By S. J. HAUSER, Vice President
The Hauser-Stander Tank Co.

CONTRARY to the belief of many, wood is still used in large quantities as a material of construction, not only for the building of industrial plants, but also for equipment of one type or another. The pulp and paper industry is one field in which the use of wood for these purposes is quite extensive.

It is used in this industry for mill-type building construction, for roofs and floors, and for a wide variety of process and general equipment.

Major uses in the construction of process and general equipment, without stressing its other uses, include applications in both pulp and paper mills.

Pulp and Paper Mill Applications

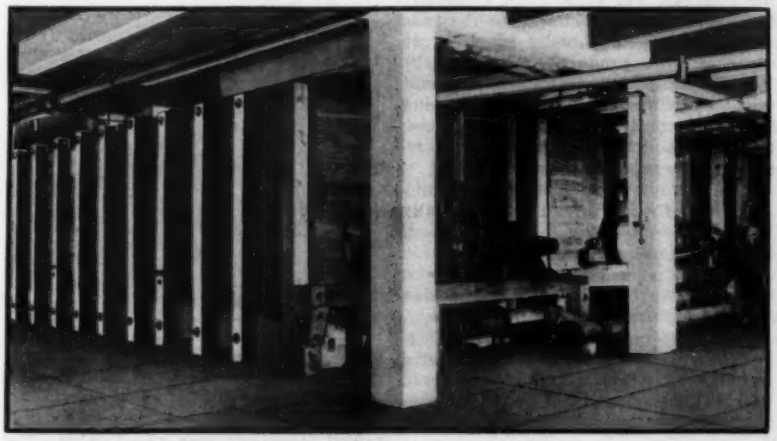
Acid storage tanks, SO_2 gas cooling ponds, reclamation or recovery towers, blow-pits, ducts from blow pits to vomit stacks, vomit stacks, condensing towers, save-all tanks, and absorbing towers are a few of the major items of equipment in which wood is commonly used as a material of construction. It is also used for riffling beds; vats for washers, save-alls, deckers, filters, and wet machines; storage tanks for bleached pulp; and head boxes, feeding troughs and flumes for screening.

Wood stave pipe in various diameters is frequently employed for handling water, white water, pulp stock, and sulphite waste liquor.

In the paper mill, tanks for storing stock from the beaters and jordans are generally constructed of wood. These tanks may be rectangular, elliptical, half-round or cylindrical in shape and are frequently of very large proportions.

Rosin size milk and alum are commonly stored in wooden tanks. Alum storage tanks may be plain or lined. Rubber or lead has been commonly used for such linings. Similar wooden tanks are also used for the dissolving and settling of alum.

Diaphragm screen vats, paper machine sand traps, head boxes of fourdrinier machines, and vats of cylinder machines suggest a few other common applications for the use of wood in the construction of pulp and paper mill equipment.



Installation of three half-round cypress stuff chests

General Equipment Applications

Large wooden tanks are often used for the treatment and filtration of vast quantities of water which is used in the mill and in the power plant. Similar tanks are employed for storing the treated or filtered water, while sewer lines are frequently made of large diameter wood pipe. Likewise, a number of process machines have been designed and constructed with wood frameworks.

Woods Used

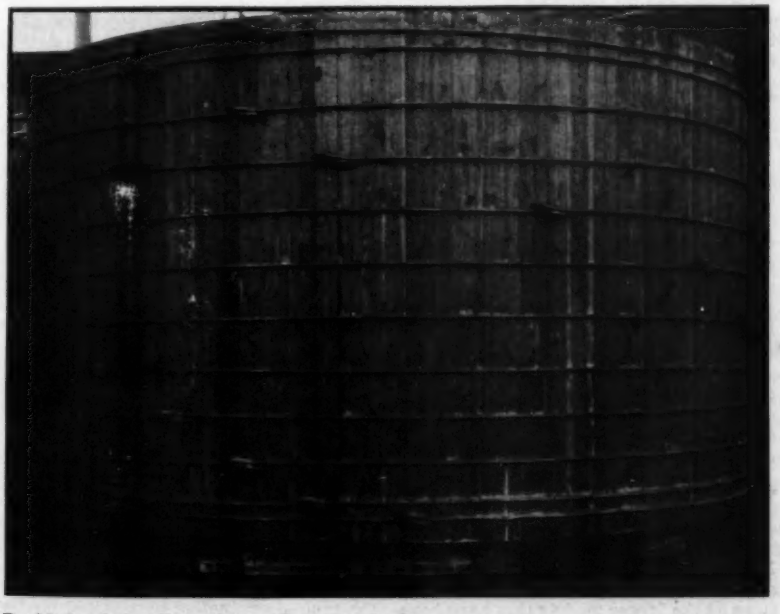
Careful consideration of the wood used for a specific purpose is essential. It is not only the selection of a suitable wood species, but also the selection of the correct grade, the direction and closeness of the grain, the degree of dryness, etc. In fact, it is frequently necessary to know the exact location and from which cut or stand of timber the lumber was obtained in order to get best results.

Genuine tidewater red cypress (not yellow cypress), California redwood, old growth yellow Douglas fir, dense southern longleaf yellow pine, and white cedar are probably the wood species most commonly used in the construction of the various tanks, troughs, etc., which have been suggested, although occasionally other kinds of wood may be satisfactory.

Acid storage tanks, blow pits, vomit stacks, etc., are usually made from heart stock of pitchy and dense longleaf yellow pine or from specially selected yellow Douglas fir. These wood species seem to stand up best under the severe conditions of this service.

The smaller tanks, flumes, stuff chests, rifflers, head boxes, sand traps, feed troughs, cylinder washers, deckers, filters, bleach vats, alum tanks, and water treatment tanks are generally made from cypress redwood, or cedar. These woods naturally resist decay and are more or less resistant to the action of the chemicals employed in the several processes.

This brief resumé of the uses of wood in the construction of equipment for use in pulp and paper mills is in no way all inclusive. Its purpose has been simply to show under what wide variety of conditions wood can be economically and satisfactorily employed.



Double-headed yellow pine acid storage tank

◆ Trempe Felt Tightener and Wire Guide

The Trempe Automatic Felt Tightener and the Trempe Wire Guide Attachment are now being constructed by the John Waldron Corporation, New Brunswick, N. J.

The function of the Trempe Automatic Felt Tightener is to automatically adjust the tension of the dryer felt to the dryer surface regardless of the temperature or percentage of moisture in the felt, and compensate for the longitudinal stretch of the felt caused by age and operation. It is not only designed for dryer felts, but is likewise constructed for cylinder wet felts. The automatic tension on the wet felts keeps the felts continually open, thereby resulting in more evenly produced papers. The Trempe equipment permits adjustment in the stretcher roll necessary for roping of felt for washing, and after the operation is completed it automatically returns to its original tension.

The Trempe Attachment for Fourdrinier Wire Guides is said to materially lessen the tension against the edge of the wire thereby saving the destruction of the selvage edge of the fourdrinier wire. It can be used with any design or manufacture of wire guide.

These two pieces of paper mill equipment are fully described and illustrated in bulletin No. 109, a copy of which will be sent without obligation to any interested executive by the manufacturer.

◆ Force Feed Lubricator

S. F. Bowser & Co., Inc., Fort Wayne, Ind., announces a new force feed lubricator known as the Figure 451, which is equipped with liquid-filled sight glasses and embodies several essential new features in force feed lubricator design and construction. A single plunger serves the dual purpose of drawing the oil from the reservoir and forcing it in a straight vertical path through the sight glass to the point of lubrication at the end of the feed line.

Each pumping unit is individually adjusted and removable while the lubricator is in operation.

A very simple method of refilling the sight glasses has been incorporated in the new Figure 451. A standard lubrication fitting permits injection of the liquid by means of a grease gun.

The new lubricator can be furnished with any number of feeds and with any type of driving mechanism required.

◆ New Photoelectric Relay Unit

A new low cost photoelectric relay, the Foto-Switch, is announced by G-M Laboratories, Inc., 1735 Belmont Avenue, Chicago. This unit embodies an electromagnetic switch which is opened or closed by the interruption or variation in the illumination on the photoelectric cell. With the Foto-Switch, any sort of electrical device, such as motors, electric signs, signals, or alarms, can be controlled through the medium of a light beam.

Photoelectric relays can be used for stopping any machine using continuous stock such as paper. In normal operation the stock interrupts a beam of light which reaches the photoelectric cell only in event that the web breaks or fails to feed through the machine.

Full information on the Foto-Switch and available accessories can be obtained from G-M Laboratories, Inc.

◆ Lifting and Tiering Truck

A new lifting and tiering truck that will pick up cleated loads with 2-inch under-clearance is announced by the Clark Tructractor Co., Battle Creek, Mich. It differs from the ordinary lift truck in that the load is carried on tapered steel fingers with a standard length of 26 inches which touch the floor

in down position. Fingers tilt back slightly in first 5 inches of rise, insuring balance for the load.

Extreme flexibility is secured by four wheel steer and rear wheel drive. The 2-ton model has a turning radius of 89 inches; the 3-ton model, 98 inches. It is gas-powered for continuous operation. Maximum lifting and carrying capacity is assured by the powerful hydraulic lift, mounted over extra large (15 in. x 7 in.) rubber tires. The speed per hour is from one to six miles. While it is capable of tiering to a height of 50 inches, the low over-all height of the machine (77 in.) makes it ideal for loading box cars. Special machines with greater tiering height to meet special conditions are built by the manufacturer on this same chassis.

◆ New Lever Operated Master Stations

For use under severe weather or atmospheric conditions, a new line of master stations has been announced by Cutler-Hammer, Inc., Milwaukee, Wis., manufacturer of electric control apparatus. Radically different from the usual master stations, these are operated from levers placed on the side of the case, instead of from push buttons on the front.

It is claimed that by this unusual construction, an absolutely watertight case is secured. The shafts of the levers operate through stuffing boxes, and the cover joint is sealed by a rubber gasket.

◆ Combination Drill Table

A new, all steel combination drill table and vise has just been announced by the Modern Machine Tool Company of Jackson, Mich. It performs the same functions as the larger models that have been on the market for years, but has been designed primarily for the smaller shop.

This new safety tool is available in three sizes, with six, seven and eight-inch square tables that open from four inches to four and one-half inches. All vises are one inch deep.

◆ Automatically Primed Pumping Unit

Announcement has just been made by Worthington Pump and Machinery Corporation of a new self-contained automatically primed centrifugal pumping unit.

The new unit comprises an electrically-driven high efficiency ball bearing centrifugal pump, mounted with its motor, on a fabricated steel bedplate, together with a Monobloc priming unit of the wet vacuum type, controlled by an electric pressure switch. The priming pump, or evacuator, is an adaptation of the well-known Hytor pump, and is licensed to Worthington under patents of the Nash Engineering Company.

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◆ T.A.P.P.I. Divisional Changes

The Executive Committee of the Technical Association of the Pulp and Paper Industry has created a new division to be known as the Converting and Consuming Division.

This division will be made up of four committees, namely, Coating, Laminating, Carton and Graphic Arts. Chairmen and personnel for these committees will soon be announced.

The Finishing, Processing and Converting Committee in the Operating Division has been discontinued and a new Finishing Committee will take its place.

The personnel of the Finishing, Processing and Converting Committee will continue as the newly formed Coating Committee, of which James J. O'Connor, technical director of the Mead Corporation, is chairman.

The Executive Committee has also redefined the field of activity of the Use Requirements Committee of the Research and Development Division.

The purpose of this committee shall be to determine the essential requirements of use for all grades of paper and paperboard, to classify these on the basis of use, to relate use requirements to properties and to establish specifications.

Parker K. Baird, of the Pulp and Paper Section of the Forest Products Laboratory, is chairman of the T. A. P. P. I. Use Requirements Committee.

H. R. Harrigan, manager of the District of Columbia Paper Co., Washington, D. C., has been appointed to the chairmanship of the newly organized Finishing Committee.

This committee expects to obtain data on the various types of finishing equipment, such as power requirements, production capacities, etc. It is expected that sufficient information will be gathered to enable each mill to determine the type of equipment best suited for its particular requirements.

◆ New Catalogues and Publications

Alexander Brothers, Inc., Philadelphia, Pa.—An interesting booklet has just been released entitled Alexander Leather Belt Drives. This booklet contains a large amount of engineering data which is presented in a comprehensive manner. There are three sections of the book: information on leather belt drives; tables; and technical information.

American Rolling Mill Co., Middletown, Ohio—Custom-Made Pipe for Paper and Pulp Mill Uses is the title of a bulletin just issued. The information is directed particularly to the purchasing executive and superintendent. The text matter is quite specific and many uses of Armco spiral welded pipe in and around paper mills are illustrated.

The Borden Company, Warren Ohio—A new Beaver product, The No. 17 Power Adapter, a pipe threader which may be operated by hand or power is announced in a leaflet just received. The use of the tool is illustrated and prices of various sizes listed.

The Esterline-Angus Co., Indianapolis, Ind.—Catalogue No. 732 has been prepared to introduce the new Model A. W. Graphic Instrument. The various types of cases in which these instruments may be ordered are illustrated and chapters take up the subject of: design, case construction, chart methods, meter elements, special features and attachments, specifications, accessories and supplies.

Grasselli Chemical Co., Cleveland—An interesting piece of literature just received, describes Cadalyte—A Process and Product for cadmium plating. The Process is the method of depositing pure metallic cadmium which has been developed by this company in its research laboratories. The Product is a dry mixture of all the chemicals required for the Cadalyte Process. These chemicals are of high quality, properly compounded and are packed and shipped in convenient airtight containers, requiring only the addition of water for use. Cadmium is used primarily for rust protection of iron and steel products; at the same time, providing a decorative finish.

Hyatt Roller Bearing Co., Newark, N. J.—A new publication designated as Bulletin No. 100 gives dimensions and load rating tables of Hyatt roller bearings and their application. There are typical mounting drawings, applicable to each respective type of Hyatt product. Several other pages are devoted to elements of bearing design, selection, load computation, correct assembly, etc. Copies will be sent to engineers, machine designers or other interested parties upon request.

Metropolitan Life Ins. Co., One Madison Ave., New York—It has been found that many valuable ideas have come from suggestions by employees, and the employee suggestion system has been adopted with considerable success by many organizations. The Policyholders Service Bureau of this company has published a new report entitled Employees' Suggestion System which is based on a study of the systems of more than 100 organizations, and will be sent gratis to a limited number of executives, personnel officers and industrial relations executives.

BOOKS

The Chemical Encyclopaedia—Since the former edition was published five years ago, the author, C. T. Kingzett, has devoted his time to the preparation of this new fifth edition, just published, in order to keep pace with the rapid progress made in scientific knowledge affecting industry, and to retain the work as a single volume. Mr. Kingzett is one of the original founders of the Institute of Chemistry. Many new subjects have been introduced, all the material has been revised and amplified, and the new edition contains more than 200 pages more than the former one. It is as up-to-date a work of its kind as may be found. This volume offers exceptional value to manufacturers and all those engaged in the study and application of chemistry. The extensive bibliographical references make it possible for users of the book who desire to do so, to obtain further information and to conduct research on practically any subject. The volume is priced at $10.00 net, and is published by D. Van Nostrand Co., Inc., 250 Fourth Ave., New York.

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◆ General Electric Employee Wins Slogan Contest

The slogan "Move Materials Mechanically—at a Profit" was awarded the prize of fifty dollars by the *Materials Handling and Distribution* in its contest which closed officially last April. The winner of the award is C. P. Krueser of the Planning Department of the General Electric Co., Schenectady, N. Y.

Honorable mention was voted to H. P. Hambright, who submitted a design for a Materials Handling Institute seal, into which his slogan suggestion was incorporated. The judges suggested that Mr. Kruezer's slogan be inserted into Mr. Hambright's seal and utilized as the trade-mark of the Institute.

◆ Waste Paper Institute to Claim Restraint of Trade

The Waste Paper Institute, through its executive committee, has arranged to take steps to determine whether centralized buying, such as is practised by a group of board mills in the East and in the West is in restraint of trade or in violation of the antitrust laws.

The Waste Paper Institute is a division of the National Association of Waste Material Dealers, Inc. The Institute will press vigorously either a complaint to the Department of Justice or some other action which will bring a determination of the legality of the scheme which undeniably results in a control of prices.

◆ THE CENTRALIZATION of all divisions of Hercules experiment and research at the new experiment station, near Wilmington, is announced by Hercules Powder Co. The change will bring all experiment activities in closer touch with the company's main offices and will enable more complete contact with industries using Hercules products.

◆ IT IS REPORTED that orders received by the American Writing Paper Co., Holyoke, Mass., during the first 20 days of August showed an increase of fifty per cent over orders booked during the like period of July. The company has a capacity of 500,000 pounds of paper per day. The orders for August received up to the 20th, amounted to 2,700,000 pounds.

◆ THE WASTE PAPER INSTITUTE announces that the Federal Trade Commission has tentatively approved a set of trade practice rules for the waste paper industry. The rules have had the full consideration and approval of the Institute.

◆ Sweden Celebrates Century of Papermaking by Machinery

Papermaking by machinery in Sweden is this year a hundred years old, and the honor of having been the first to set up a paper machine falls to Klippans paper mill in southern Sweden which is still active.

In fact, the Klippan mill is much older than that, dating from 1523, when it was founded by Sten Bille, an uncle of Tycho Brahe, the great astronomer, in what was then the Danish part of southern Sweden. It is the oldest paper mill in the country. Bishop Hans Brask is supposed to have started a paper mill in his Swedish diocese near Linköping in the 1520's and a few years later the king, Gustaf Vasa, built one of his own near Stockholm. None of these are now in operation. On the other hand, the largest Swedish mills are now located in the central and northern parts of the country, where the largest pulp supply is found.

The first Swedish papermaking machine was made in England by the firm of Bryan Donkin & Co. The first six months it produced 44 tons of paper and the following year 131 tons. Of the original machine nothing now remains but the drawings, supplied by the manufacturers who are still in business, and they have been reproduced in a memorial booklet, issued by the Klippan Company.

◆ Miss Callie Nason

The unusual career of Miss Callie Nason, the first and only woman to manage a paper mill in the State of Wisconsin, and one of the few to have that distinction in this country, came to a close, with her recent passing at her home in Wisconsin Rapids, Wis. Miss Nason was sixty-six years of age; she had been laid up since last spring when she suffered a severe fall.

A historical sketch of Miss Nason's career as a paper mill executive was published on page 133 of the May, 1932, issue of THE PAPER INDUSTRY.

◆ BAHR BROTHERS Mfg. Co., Marion, Ind., have owned and operated a plant at Albany, Ind., for the past five years where they have conducted experiments in the manufacture of machinery for the paper industry. Having completed this work, the plant was sold September 1 to a corporation known as the Albany Paper Corporation.

◆ McLEOD & HENRY Company, Troy, N. Y., announces that its silicon carbide commodities, known as Carbex, will now be offered to the trade by the General Refractories Co., Philadelphia.

◆ TWO THOUSAND tons of newsprint paper and approximately 750,000 feet of rough lumber were destroyed by fire in a warehouse of the Strachan Shipping Co., Jacksonville, Fla., August 22. The damage was estimated at $275,000. The paper was owned by the International Paper Company and the lumber by the American Pitch Pine Corporation.

The MONTH at WASHINGTON

BUSINESS Conference—With nearly 200 of the Nation's leading financiers and industrialists brought together in a business conference, from the twelve federal reserve districts business and industrial committees, it is confidently expected that some definite steps will shortly be taken to improve our economic welfare. The conference was called to plan an attack along the whole economic front by our business generals. Wider promotion of the trade acceptance method of doing business, encouragement of a pool to buy high grade stocks and bonds, arrangement of loans to assist home ownership, initiation of credit surveys, direct loans to business by Federal Reserve Banks, methods of spreading available employment and of expanding employment, wider credit expansion to assure consumption of goods, expansion of railway repair and maintenance work, protection of bond holders and mortgage renewals, are some of the plans discussed and from which concrete plans will be developed to provide a concerted program of action along the whole economic front, looking to stimulation of our economic recovery, outlining specific projects for definite accomplishment and the co-ordination and mobilization of private, state and federal instrumentalities. Twelve committees were organized to advise on particular questions concerning a canvass of the means, methods, agencies and powers available for general advancement, wider expansion of credit facilities to business and industry; co-ordination and expansion of livestock and agricultural credit facilities; co-ordination and expansion of financial facilities for the movement of commodities into consumption; creation of an organization for further spread of existing employment and expansion of employment. As a result of the conference, permanent executive committees were organized to preside over our great financial and industrial resources and acting in a measure as a planning committee for the Nation's economic development, not to have dictatorial powers, but to achieve its ends by being a clearing house of pertinent information and whereby factors which control commodity prices might be improved. Its function also is to devise methods whereby available funds can find their way into industry from the Federal Reserve Banks so that deserving enterprises can obtain the necessary loans to expand their businesses. With a closely knit organization of business and industrial leadership, it is felt that a definite contribution can thus be made toward economic advance. With increased employment would come consequent increase in buying power in the consumer field; employment was one of the main themes of the conference. With a nation-wide effort planned to spread the opportunity for work, shorter periods of labor to create new jobs, it is felt that definite benefit will result to the nation.

Signs of Economic Recovery—All along the line are found evidences of business revival, reports from various parts of the country received at the White House indicating business upturn. Wholesale commodity prices are continuing to rise and maintain a steady upward movement. Retail food prices are also showing an advance, a gain being shown for the first time since last October. An upward trend is also noted in employment with industrial expansion and improvement in several industries, like textiles, etc. Favorable economic notes have been sounded in Canada, Australia, the Philippine Islands, India, and British Malaya. In fact, economic sentiment is found improved in America and the World, with return flow of gold and reduction in bank failures cited as factors in increased confidence. Employment has risen in New England as industries in that locality revived, with the recent reopening or expansion of operations of numerous manufacturing plants and the re-employment of thousands of workers.

Interstate Commerce Rulings—By an order recently entered, the Interstate Commerce Commission suspended from August 15th to March 15th next, the operation of certain schedules, proposing to reduce import and intercostal rates on wood pulp in carloads from North Atlantic ports to destinations in Central Freight Association territory.

In Wichita Falls Chamber of Commerce vs. Chicago & Eastern Illinois Railway Company, No. 22415, rates on paper and paper articles, in carloads, from various points in Wisconsin, Minnesota and Michigan, to Wichita Falls, Tex., were found not unreasonable but unduly prejudicial to Wichita Falls and unduly preferential of Fort Worth, Tex., and a basis of rates was prescribed to remove undue prejudice, but reparation was denied. The complaint was filed on behalf of the Empire Paper Company, alleging that the rates were unjust and unreasonable, unjustly discriminatory and unduly prejudicial.

Rates charged on flood-damaged paper, in carloads, from Houston, Tex., to Hutchinson, Kans., were found unreasonable in another decision, Emerson Carey Fibre Products Company vs. Chicago, Rock Island and Pacific Ry. Co., No. 24669, and reparation was awarded.

Foreign Market for Carbon Paper—To the manufacturer who has relied upon foreign markets to absorb a definite proportion of the goods he produces in a given year, has not suffered from the foreign market for carbon paper which has held up well. Domestic production of carbon paper amounted to $7,885,519 for 1931 compared with $10,157,384 in 1929, or a decline of 22 per cent. Figures compiled show that in spite of greatly decreased production and export totals, export markets continue to absorb almost their normal share of factory production.

In general exports of paper and paper products declined for the first six months of 1932, with a 72 per cent reduction in shipments of wall paper and a general decline in paper and paper products of 30 per cent, compared with the first six months of 1931. Greaseproof and waterproof papers, overissue and old newspapers and surface-coated papers recorded advances.

Paper Notes of Interest—Further depression in the German pulp and paper industry is reported, while existing wage agreements in Norway will be continued until May 15, 1933. The output of paper and board in Italy during the second quarter of the current year was slightly less than during the preceding three months.

A glue with a cellulose base has recently been introduced on the German market by the concern which first commercialized the manufacture of transparent cellulose sheeting. The new product is intended for use in wall paper coating, etc.

The manufacture of corrugated and solid fiber shipping containers in the United Kingdom appears to be progressing.

Airplane Express Gains—More than 240 commodities were shipped by airplane express during the calendar year ending 1931, says the Department of Commerce, showing the growing popularity of air express for the speedy transportation of a wide range of commodities. This is the first time that such a study has been compiled by the department. More than 55 per cent of all shipments originated in the midwest, the central Atlantic states contributing 17 per cent, the Pacific Southwest 14 per cent and the New England group 4 per cent.

New Facts on Metric System—A revised third edition of the International Metric System of Weights and Measures has just been released by the Bureau of Standards, giving a brief history of the system, including the establishment of the International Bureau of Weights and Measures by 17 nations, with a complete synopsis of the system, with explanations of the methods of deriving the various units, quotations from the U. S. laws, defining the status of the metric system in this country.

Recommendations on Folding Boxes—Simplified practice recommendation R127-31 covering folding boxes for use by department and specialty stores is now in print and may be obtained from the Government Printing Office, Washington, for five cents each. This recommendation provides 59 selected sizes of this type of box.

POWER

GENERATION + UTILIZATION + MAINTENANCE

This section turns the searchlight on power and its allied problems, showing big possibilities to save. Opportunities to improve conditions, methods, apparatus will be discovered. Worth while practices suggest new ideas and wider usages of equipment.

By W. S. JOULE

◆ Valve Leaks Important

Valve leakage is an especially important point to keep in mind, since a ½-in. diameter stem, leaking all around the stuffing box, will blow about 40 lb. of steam an hour, with 100 lb. pressure in the valve. It is easy to estimate what this sort of thing does to the coal pile in a month or a year.

Leaky valves should be repaired as soon as possible after the leak is discovered. Leaks in valves may sometimes be due to the distortion of the valve seat, caused by the weight of piping carried by the valve. There should be supports near all valves. Sometimes, valves are seriously strained when being assembled into the piping system by carrying the twist through the body of the valve. The wrench should always be applied to the end at which the threaded connection is being made.

When lead or similar substance is used in making up joints, it should always be put upon the entering parts. The excess is then forced back upon the outside and can be wiped off instead of being pushed inside where it may cause trouble on valve seats or at other points.

All dirt and scale should be rapped and scraped from pipe, valves and fittings before erecting, and all new work and repair work should be blown out, with live steam if possible, before being put into service.

One cause of leaky safety valves is the strain of the body due to the weight of the pipe carrying the blowoff to the roof. In many cases, this condition has been overcome by supporting the weight of the pipe independently and making some kind of a slip joint between it and the valve.

◆ Proper Operation of Clinker Crushers

With modern underfeed stokers, clinker crushers are usually installed. In operating this type of stoker, a few simple precautions in handling these clinker crushers should be incorporated in the boiler room routine. They will save time in starting and stopping stokers and will obviate any trouble from the crushers themselves.

Even starting a fire on a stoker equipped with a rotary clinker crusher, it is recommended that the crusher pit be filled with ash up to the bottom of the extension grates. If for any reason this cannot be done, the operator should be extremely careful to see that all fuel is burned out before it is pushed into the crusher pit. It will be obvious that in the latter case, it will take considerable time to establish normal conditions in the fuel bed.

When the stoker is shut down for inspection or repair, the crusher pit should be emptied and, if any work is necessary on this portion of the stoker, it should be done first; in the meanwhile, the ash should be left on the retorts and tuyeres. After the work is finished in the clinker crusher and pit, the latter can be filled with the ash and clinker that were left on the stoker. Thus the pit will be in condition for starting the fire without delay, as explained above.

In most cases, crusher aprons should be set nominally to within 2 or 3 in. of the crusher rolls. Greater distance than this may cause the ash to discharge faster at some sections than at others, thus causing uneven fires and smaller distance may prevent proper clinker discharge and overload the crusher itself. In case the ash does not feed down over some particular apron section, the position of the apron may need to be changed. Aside from this, the position of the aprons seldom needs to be altered. When it is found that ash does not feed into the crusher pit fast enough, the speed of the crusher rolls should be increased, instead of changing the position of the aprons.

◆ Suggestions for Using Concrete Construction

An almost endless variety of jobs around a paper and pulp mill can be solved by means of concrete. It is so easy to use and requires so little relative skill that it offers many advantages over other materials for different forms of construction, extensions and rehabilitation. There are so many places where the fact that concrete is rot-proof and rust-proof, where it is neither subject to injury or deterioration from moisture is important, that every pulp and paper maintenance engineer is called upon sometime to handle a concrete job. Another advantage is that while steel must be brought from some industrial center, doing a concrete job merely means obtaining the cement in sacks, the lumber or other types of forms being built up "on the job" with the labor that is always available around the plant.

Most engineers know that constant contact with moisture increases the strength of the concrete. In fact, concrete actually improves with age when used for such applications as dams, water tunnels, reservoirs and similar structures. This does not mean, however, that the more mixing water used the stronger the resulting concrete. On the contrary, the strength of the concrete is inversely proportional to the amount of mixing water used. Professor Duff A. Abrams, director, Research Laboratory, Portland Cement Association, has expressed the condition concisely when he said: "A minimum of water in mixing concrete, and a maximum for curing it, will give the greatest strength."

While the power plant engineer is not primarily interested in the technique of designing concrete mixes, he is confronted from time to time with problems which require some knowledge of this field for their successful solution. The following table, showing the relation between the volume of water to the average compressive strength of the resulting concrete using average materials will be of interest:

Approx. compressive strength of concrete at 28 days lb. per sq. in.	Mixing water U. S. Gal. per sack (cu. ft.) of cement
3800	5
3400	5½
3000	6
2600	6½
2300	7

It will be noted that each additional half gallon of water decreases the strength of the concrete from 300 to 400 lb. per sq. in.

If the sand and pebbles (or crushed rock) used in mixing the concrete are damp, the moisture in them should be considered a part of the mixing water, and a deduction must be made for it, if concrete of a specific strength is desired.

Using a small amount of mixing water has another advantage besides that of producing concrete with a high compressive strength. It also, when a plastic mix is secured, makes the structure more watertight, by producing a less porous concrete. The amount of mixing water used is thus inversely proportional to the resulting strength of the concrete, and directly proportional to its porosity.

The question of how much water to use is an important one, as brought out in the above. While it is true that concrete does not need to be handled very carefully, and requires practically no skill to mix or pour it or even to build the forms to receive it, it is absolutely true that the amount of water used, the proportion of sand and pebbles used is very important, just as it is also important that the sand be clean and free from vegetation and other dirt.

Critical Supervision Safeguards your Quality

Every step in making Appleton Felts—from the selection of the raw wool, on through our plant right up to the last operation that makes a finished felt—is subjected to supervision—a critical supervision that is actually an absolute control of production. And, for what purpose? To safeguard quality—to likewise assure you quality in your product. Appleton Felts must be nothing other than quality felts. Whether two or twenty, they must be alike—and made for the definite requirements of the customer.

Is it any wonder, then, that today Appleton Felts are standard for design, quality and service?

Let Us Help You

Perhaps our accumulated experience will help you solve your felt problems. Write us anytime.

APPLETON WOOLEN MILLS
Appleton, Wisconsin

Appleton
Felts and Jackets

+ CANADIAN NEWS +

◆ The Newsprint Situation

Canadian newsprint mills produced in July 142,491 tons, against 161,368 tons in June and 182,731 tons in July 1931. Shipments totaled 145,431 tons in July, against 164,310 in June and 175,350 in July 1931. Stocks were 47,017 tons on August 1, against 50,029 on July 1 and 47,288 on August 1, 1931. The exports of newsprint from Canada in July amounted to 2,635,607 cwt., valued at $6,289,600, as compared with 3,144,106 cwt., valued at $8,223,891 in July of last year.

In a recent statement regarding the newsprint industry and its future, President Alexander Smith of Abitibi said that, while conditions in the newsprint industry showed no immediate promise of improvement, which must wait a definite upturn in the general business situation, it was well to remember that, in comparison with other heavy manufacturing industries, newsprint consumption was being well maintained, further expansion was definitely ended for several years to come, and there was an increasing tendency toward lower productive capacity through the elimination of obsolete plants, which could not continue to operate indefinitely under present competitive conditions.

Another rather optimistic comment appeared in the New York Times, which considered that the July newsprint production and shipment report gave further indication of the extent to which this industry has been adjusting itself to current conditions, while at the same time preparing for a recovery. It marks the second successive month in which shipments have exceded production, with the result that stocks have now been reduced to about eleven days' supply; at the same time, the potential capacity of the industry has been steadily reduced as obsolete and high cost properties have been written down or completely off the books.

On the other hand, the extremely unfavorable position of the Canadian newsprint industry is, in financial circles, regarded as having been revealed by the announcement in quick succession of three defaults on payment of bond interest, respecting the securities of Abitibi, Price Bros., and Lake St. John companies. The situation is attributed to the three following conditions: low price of newsprint, insufficient markets, and mill capacity far in excess of present market demand.

◆ Taschereau Doubts Benefits of Imperial Conference

With the closing of the Imperial Economic Conference held in Ottawa during July and August, the feeling seems to be quite general that splendid work was accomplished and that a solid foundation has been laid for the development of intra-Empire trading. Premier Taschereau of Quebec, however, has made it quite plain that he did not regard the result as at all satisfactory to the lumbering industry of Canada in general, and of Quebec in particular. It is true that the 10 per cent preference on lumber remains, but that is entirely inadequate to permit Canada to compete with lumber from Northern Europe, and more particularly from Russia. And even if the Russian-British treaty is renounced in six months from now, it will be too late to do anything at the next session of the Legislature, and for the following season there will be only hope and nothing assured.

◆ Woodlands Section Inspects Hardwood Operations

The summer meeting of the Woodlands Section of the Canadian Pulp and Paper Association was held during the first week in August at the operations of the Singer Manufacturing Co., at Thurso and Singer, Que.

The party gathered at 10 a. m. on August 4th at the office of the Singer company, in Thurso, and the morning was spent in an inspection of the sawmill, hardwood impregnating plant, and logging railroad equipment, etc. From Thurso the party proceeded by cars about 30 miles to the company's depot at Singer, where luncheon was served. The afternoon was spent in inspection of limits and logged-over country, logging railway equipment, the nursery and plantations, etc. Transportation was by speeders on the logging railroad and by motor boats. The evening was devoted to discussions of such subjects as the reduction of accident costs, the use of motor trucks, aerial photography, etc.

QUEBEC

◆ Lake St. John Co.'s Position Outlined

Some considerable time must elapse before the Lake St. John Power and Paper Co., will be able to pay the interest on its first mortgage bonds. It is stated by the company that, under present market conditions, it will have an assured operating income for the next two years substantially more than sufficient to meet all operating expenditures, but that some considerable time must elapse before the liquid position of the company can be sufficiently improved and its net earnings sufficiently increased to enable interest to be paid on its first mortgage bonds.

The company's ten-year contract with large publishing interests in the United States still remains in full force and effect, with adjustments as agreed upon with the publishers from time to time, and continues to stand in the name of the company. The fact that revenues from this contract have been insufficient to prevent default taking place in the payment of interest on the bonds and debentures is due in part to the allocation from time to time to other companies for manufacture by them of certain portions of the tonnage covered by the contract, which allocations were imposed on the company by the Newsprint Institute of Canada, and in part to the decline in newsprint prices.

Since the formation of St. Lawrence Corp., of which Lake St. John Power and Paper is a constituent company, the greatest care has been taken to preserve the assets of the latter company intact in its own ownership and control, and there have been no allowances of tonnage, earnings or other benefits by the company to the St. Lawrence Corp., or any of its other subsidiaries.

◆ APPROVAL of the reorganization plan for the Donnacona Paper Co., which was outlined in these columns last month, has been given by the first mortgage bondholders. Of the total of $6,584,000 of bonds outstanding, $3,370,000 were represented at the meeting, and $3,262,000 voted in favor of the plan.

◆ IT IS ANNOUNCED that the production of the Three-Rivers mill of Canadian International Paper Co. will be doubled for at least the next two months, following the signing of two heavy orders, one from England and the other from Argentina. It is said that after severe tests the company's paper was found superior, and that this is partially attributed to the quality of the water supply.

◆ CANADIAN HYDRO - ELECTRIC Corp., and subsidiary companies, including Gatineau Power Co., report that consolidated net revenue for the second quarter of this year, after deducting all prior charges and available for dividends, amounted to $762,180 as compared with $480,535 in the second quarter of 1931. Balance added to surplus in the second quarter of this year, after dividends on the 6 per cent first preferred stock, was $574,680 against $293,035 in the corresponding quarter of last year.

ONTARIO

◆ Firstbrook Boxes Default Bond Interest

Following extended negotiations with institutions holding a large proportion of its bonds, Firstbrook Boxes, Ltd., Toronto, manufacturers of paper boxes and other lines, passed into default on August 15 following failure to pay bond interest due June 15 on its 6 per cent first mortgage bonds, of which some $487,500 are outstanding.

It is stated that no agreement could be reached with large bondholders who, after a comprehensive steady of the situation, are inclined to favor foreclosure rather than conpromise their rights under the trust deed. Bondholders have been notified of a meeting to be held on September 14 at which a protective committee will be appointed.

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for Safety—Economy—Efficiency

A mild alkaline salt for cleaning of felt and all general cleaning purposes. A trial will convince you of its merits.

Other Grasselli Chemicals for Paper Manufacturers

Acetate of Lead	Barium Sulphate (Blanc Fixe)	C. P. Sulphuric Acid
Aluminum Sulphate, Commercial	Bleach	Muriatic Acid
Aluminum Sulphate, Iron Free	Caustic Soda	Salt Cake
Aqua Ammonia	C. P. Ammonium Hydroxide	Silicate of Soda
Barium Carbonate	C. P. Hydrochloric Acid	Soda Ash
Barium Chloride	C. P. Nitric Acid	Sulphuric Acid

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Sale of the company's assets, if necessary, would be possible at a figure in excess of $1,000,000. The company's comparatively new plant is at Mount Dennis, near Toronto, and it also owns plants at Thessalon and Penetang. It has Canadian and British Empire rights to patents owned by the Robert Gair Co., New York.

◆ UNTIL THE FINAL adjustment of the Ontario Power Service situation and a "clearer view of the immediate future of business in general and the newsprint industry in particular," payment of bond interest by Abitibi Power and Paper Co. is postponed, according to a recent statement of the directors. The interest payments on the first mortgage bonds were due June 1 and the company then went into technical default. The 60-day grace period, however, expired only on August 1. Heavy obligations of the company incurred on behalf of the Ontario Power Service Corp. were stated as one of the reasons why interest had not been met as due.

◆ THE LARGEST PLANT to be established in Canada since the boom days of 1929 will soon be doing business at 888 Dupont St., Toronto, where a vacant textile factory is being prepared for the reception of machinery for the British firm of E. S. and A. Robinson, of Bristol, one of the largest printing and lithographing firms in England. It is stated that 150 workmen will be engaged in the Toronto plant.

◆ INTERLAKE Tissue Mills Co., Ltd., has installed a new toilet paper machine at its plant at Merritton.

BRITISH COLUMBIA

◆ Important Changes at Powell River

The following changes in the executive positions of the Powell River Co., effective as from August 1, have been announced:

Richard Bell-Irving, who has been resident manager at Powell River for many years, has been appointed assistant general manager. The position of resident manager, vacated by Mr. Bell-Irving, will be filled by J. Falconer. His position as assistant resident manager of the Powell River mill is being taken by P. Sandwell.

William Barclay, who has been in charge of the head office at Vancouver and associated with the sales operations of the company for the past 16 years, has been appointed sales manager, with headquarters in Vancouver. E. C. Lee has been promoted assistant to the executive vice-president and general manager.

R. H. Scanlon, who was formerly joint assistant resident manager at the plant, resigned his position following the death of both his father and mother, but will still retain his position as a director of the company. It is understood that the present reorganization is partly the result of this resignation, as the former policy of having two assistant resident managers and a resident manager has been dropped in favor of the new posts of assistant general manager, resident manager and assistant resident manager.

MANITOBA

◆ IT IS STATED that the Minister of National Resources of Manitoba is being urged to take steps to have the Pine Falls mill of the Abitibi company get into operation again. It is contended that circumstances make the reopening of the mill possible and the Government is being urged to demand that the company live up to the condition of its agreement that the mill be kept running ten months in every year. Failing this, it is suggested that the agreement be canceled under which the company have a concession of 2783 square miles of timber limits, upon which there are 6,000,000 cords of pulpwood.

◆ INTERLAKE Tissue Mills, Ltd., recently opened a direct factory branch in Winnipeg for distributing its line of paper products in Manitoba. P. Christie, who has had a number of years of experience with several large paper concerns and who is well known throughout the trade, has been appointed manager.

NEW BRUNSWICK

◆ OWING TO the lower demand for newsprint, both in Canada and the United States as well as overseas, the operations of the Bathurst Power and Paper Co. have decreased. At the present time, prospects of any marked advance in consumption do not appear to be overly bright and continued low operations are to be expected, in so far as the months immediately ahead are concerned. Faced with the prospect of low demand, the management of the company decided to produce other forms of pulp products and to that end turned over one newsprint machine to the manufacture of kraft liner board. This has had an appreciable effect in improving operations and is also expected to bring about some improvement in the company's earning power.

◆ THE NEW BRUNSWICK International Paper Co. has announced that, because of present marketing conditions, the paper mill at Dalhousie will run only at about half its productive capacity. For the present, only two of the four machines will be operated.

NOVA SCOTIA

The Mersey Paper Co., of Liverpool, N. S., had a highly satisfactory year in 1931. The mill was operated at capacity for practically the whole period and both gross and net profits were substantially higher than in the preceding year. Bond interest before depreciation was earned over two and a half times and all other charges were well covered, leaving sufficient surplus to have paid preferred dividends fully. Gross profits for the year totaled $1,093,573 as against $852,922 in the preceding fiscal period. This was accomplished by an intensive campaign to build up new markets in the face of a steady decline in the consumption of newsprint on this continent.

◆ ◆ ◆

◆ Papermaking Lecture Illustrated with Papyrus Grown in Greenhouse

A seminar on plant sciences, attended by teachers of botany and pharmacognosy from the United States and Canada, was held in the splendid new Botany building of the University of Toronto the week of August 15.

One of the items on the program was a lecture on papermaking by T. Linsey Crossley, who in discussing the earlier forms of raw materials for writing surfaces, exhibited fine specimens of papyrus, about six feet long, freshly cut, by the courtesy of Professor R. B. Thomson, head of the Department of Botany, from plants growing in the new greenhouses.

◆ Survey Reveals Tremendous Wood Waste

A joint committee representing the National Committee on Wood Utilization of the Department of Commerce and a group of New York business men, has just completed a survey on the wood-waste problem of the state of New York.

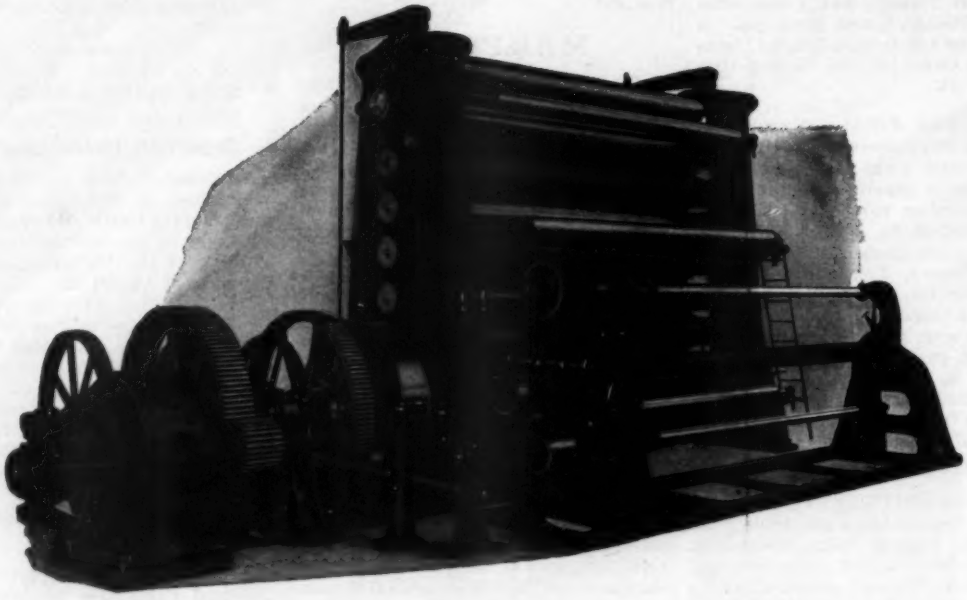
George W. Sisson, Jr., Potsdam, New York, who is chairman of the committee, states that if the annual waste in the State forest and woodworking industries were converted into lumber, it would aggregate approximately 100,000,000 board feet, sufficient to make a solid train 55 miles in length. Much of this waste material, according to Mr. Sisson, is not even used for fuel and people do not realize that composition products such as linoleum, pulp and paper, toys and novelties, may be made from it.

The National Committee on Wood Utilization is a co-operative undertaking between industry and the Government, working for better methods of converting wood and the improvement of wood-using methods. It is now engaged in a nation-wide survey of wood waste by states and can already point to many definite accomplishments in the salvaging of wood waste as a profitable business, carried out as a result of its recommendations.

◆ Masonite House to Be Shown at Century of Progress

Plans and specifications for the Masonite House to be erected at A Century of Progress exposition in 1933 have been approved and submitted for bids. It is the intention of the Masonite Corporation to proceed with construction at once, and the house may be open to the public in the early fall.

Masonite Presdwood will be used for the exterior of the house and the floors. The bedrooms are being constructed with masonite to illustrate some unusual wall treatments and effects which can be obtained with masonite board.



LEADERSHIP

NOT written to please, but to state the reason why HOLYOKE MACHINE and LEADERSHIP mean the same thing to the experienced operator and buyer of Wood Pulp and Paper Mill Machinery. Constant improvements in stride with the times and in keeping with good mill practice, plus an unwavering standard of high quality account for the LEADERSHIP OF HOLYOKE.

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Manufacturers of Super-Calenders, Platers, Cotton and Paper Rolls, Washing and Beating Engines, Wood Pulp Grinders, Barkers, Chippers, Rag and Paper Dusters, Rag Cutters, Hydraulic Pumps and Presses, Hercules Water Wheels and Governors.

The HOLYOKE MACHINE COMPANY

FOUNDED 1863

Fourdrinier Wires

(Continued from page 420)

sustained by the wire at the time of installation will result in shortened service from it. Before placing a new wire, it should be ascertained that the surface of the rolls are clean and smooth, care being taken to remove all patches of pulp or accumulated dirt from the rolls, for such foreign materials would cause uneven bending of the wire and result in uneven tension on it.

The stretch roll should be cleaned by means of a good shower to wash away all pulp from the roll and aid in keeping the wire clean. A mechanical indicator to measure the tension on the stretch roll is of value for obtaining data to show the effects of different tensions on the life of wires. Records of these measurements will enable the operator to duplicate conditions which have been found most satisfactory.

Whenever the chance is afforded, due to a shutdown of sufficient duration, the wire should be washed with a large volume of fresh water, the back side of the wire being washed just as thoroughly as the front, that is, avoid flushing foreign material from one edge of the wire to the other. The best policy is not to clean the wire with acid unless it is absolutely required. When it is necessary to sour the wire, as this treatment is known by papermakers, it should be remembered that the comparatively strong acid employed must be used intelligently. Too extended treatment will result not only in removing material which should be dissolved or loosened from the wire, but also in attacking and weakening the wire. After souring the wire, care must be taken to wash off all traces of the acid, which requires using a large amount of water.

It is generally acknowledged that suction boxes are the cause of most of the abrasion on the wire. Considerable strain is also placed on the wire because of the drag on it, owing to the tendency of the suction box to pull the wire to it while the water is being removed from the sheet. Many attempts have been made to decrease this deleterious effect by altering the size, shape or relative location of the opening in the cover of suction boxes. It is considered good practice to have the several suction boxes located close to each other on the machine. Various materials have been used in place of wood as a top or wearing surface, but wood is still by far the most generally used.

Many mechanical appliances devised to decrease abrasion at the suction box have also been developed, for example, a suction box oscillator which is designed to keep the box moving under the wire at all times in order to avoid grooving and, consequently, unequal wear on sections of the wire. The use of carrying rolls on the sides of a suction box is also said to decrease the abrasion. It is apparent that excessive suction on the boxes places an unusual drag and strain on the wire, not only increasing wear on the wire, but also causing danger of collapse of the wire at the suction box.

A recent investigation to determine why the useful life of a fourdrinier wire is shorter in summer than in winter disclosed some interesting results:

(1)—As the temperature of the water increases, the lubricating property of the water decreases and there results more grinding action between the covers of the suction boxes and the fourdrinier wire. This would be accentuated in summer when the water is warm. At the same time, so far as the couch roll is concerned, the abrasion at this point should be decreased when the water is warm, since there should be less slippage between the wire and the driving roll.

(2)—A series of tests demonstrated that as the temperatures of the water increased, the corrosive effect of a mill alum solution was accelerated. This had an important influence upon the tensile strength of a wire and, consequently, on the useful life of a fourdrinier wire.

(3)—Cracks will develop in a wire when deposits find their way between the surfaces of the warp and shoot wires, thus causing uneven strain. This deposit may become particularly noticeable in summer months when the water is warm.

The above study shows that warm water produces two effects: first, abrasion at the suction boxes and strains due

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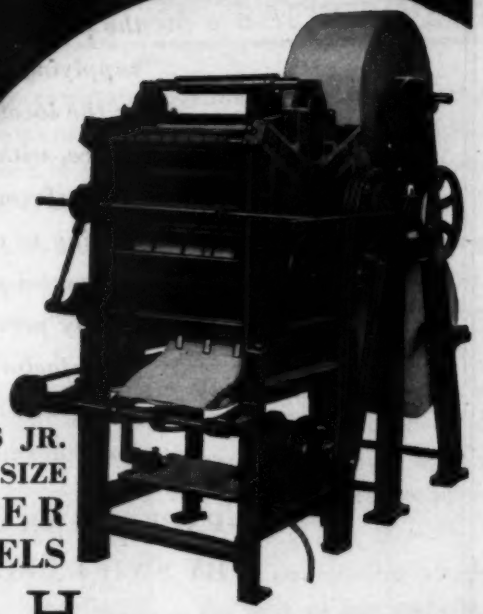

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Built on our exclusive full rotary principle which operates more efficiently than any other at high speeds. Simple mechanism and sturdy construction give a machine that will turn out a large volume of paper towels at a production charge of only a few cents a case. It is economical to operate, will give a constant steady production with a minimum of down time.

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to incrustations are increased; second, the slippage of the wire at the couch roll is decreased.

If grit or sharp material is contained in the filler which may be used to load the sheet, the abrasion on the wire will be increased considerably. It must be remembered that the wire is not elastic and the result of any deformation will remain in the wire and will very likely mark the sheet made at such a place. It is necessary to retain a smooth flat surface and many of the points mentioned above indicate ways to decrease strains and distribute them uniformly across the entire width of the wire, thereby avoiding damage and increasing the useful life of the fourdrinier wire.

❖ ❖ ❖

◆ Highlights of T.A.P.P.I. Program

A splendid, practical program on wood pulp specifications and classification has been arranged for the fall meeting of T.A.P.P.I. at Holyoke, Mass., September 13 to 16.

Would it not be of great help to you to know how to specify the kind of pulp you would require for a bond paper so that you would not buy a pulp better suited for a book of papeterie? Would not the classification of pulps, based on a use factor, mean more than simply buying a good bleached sulphite at a price?

The Institute of Paper Chemistry has completed its report on the comparison of the stability and permanency of cotton and wood cellulose. This question has been of universal interest. Its discussion should bring up points that we have all tried to explain. Lend your ideas and discussion to this much discussed subject.

The final report of the T.A.P.P.I Fellowship will be given. Mr. Doughty has spent three years on this work. To get the most out of this you should hear him discuss his subject.

Have you had trouble in determining the pH of your white water washer or beater—when chlorine was present? A method has been developed and its practical use and advantages will be discussed.

The paper by D. W. McCready will contain the results of his investigations into the application of chemical engineering principles to the unit process of paper drying. This is the first of a series of papers to be presented by Mr. McCready of the faculty of the University of Michigan.

The initial effort of the Technical Association in writing specifications is embodied in the report of the T.A.P.P.I Materials of Construction Committee on the selection of an alloy suitable for use in handling the liquors handled in the sulphite pulping process.

Two papers relate to stuff preparation, one by W. Boyd Campbell, outlines a theory concerning what happens to fibers during the beating process. Doctor Campbell has devoted many years to research into this problem. A. B. Green's paper deals with the commercial application of some of the beating theories to the end that machinery may be designed and constructed to accomplish efficient stuff preparation.

◆ Hammermill Twenty-first Annual Conference

Paper merchants who market the Hammermill products gathered in Erie, Pa., August 24 and 25 for their twenty-first annual conference.

Members of the Agent's Advisory Committee spent the forenoon of the first day consulting with the officials of the Hammermill Paper Co.

Ernst R. Behrend, president of the Hammermill Paper Co., opened the general business session at noon. Talks were given by Norman W. Wilson, vice president of Hammermill, and Harrison R. Baldwin, manager of sales.

During the afternoon, the visitors had the pleasure of listening to Bruce Barton, noted writer and advertising counsellor. Mr. Barton spoke on the history of business depression. The speaker stated that he had never been guilty of saying, "Prosperity is just around the corner," but he was of the opinion that the present activity in the stock market would be reflected in better orders about October.

A. Ellis Frampton, advertising manager, and Donald S. Leslie, assistant manager of sales, spoke the morning of the second day's meeting. The business session continued until noon when the visitors adjourned for their favorite form of outdoor recreation. Five prizes were supplied by the agents to be competed for by the Hammermill men.

A PRODUCT with a BACKGROUND

The superior finishing qualities of Perkins Calender Rolls are the natural result of the longest and broadest experience in the highly specialized art of making calender rolls.

The Perkins process of preparing materials for filling rolls insures uniform density, a high degree of resiliency and unusual endurance. The patented double spline is an exclusive Perkins feature.

NO CALENDER CAN BE BETTER THAN THE ROLLS IN IT

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Refills and remakes include the rolls of any manufacture, domestic or foreign, for any application in the paper industry.

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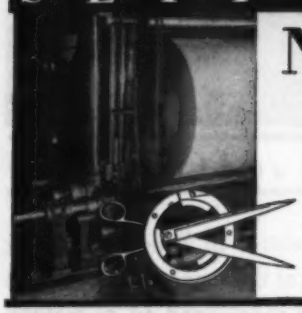
LANGSTON SLITTERS



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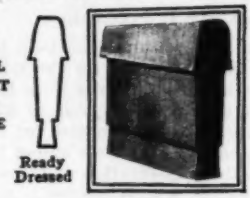

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July Scores

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PERFECT SCORES

Division I—Paper and Pulp Mills

	ENTRANT	MILL	LOCATION
GROUP A	Hollingsworth & Whitney Co.	Algonquin & Taconnet	Winslow, Me.
	Container Corp. of America	Manayunk	Philadelphia, Pa.
	Champion Coated Paper Co.	Paper No. 2	Hamilton, Ohio
	Spruce Falls Power & Paper Co., Ltd.	Kapuskasing	.....
	Kimberly-Clark Corp.	Kimberly	Wisconsin
GROUP B	Champion Coated Paper Co.	Paper No. 1	Hamilton, Ohio
	International Paper Co.	Niagara Falls	New York
	Consolidated Paper Corp., Ltd.	Laurentide	Quebec, Can.
	Consolidated Water Power & Paper Co.	Wisconsin Rapids	Wisconsin
	Continental Paper & Bag Corp.	Rumford	Maine
	Fraser Companies, Ltd.	Fraser Paper, Ltd.	Madawaska, Me.
	Kimberly-Clark Corp.	Niagara	Wisconsin
	St. Croix Paper Co.	Woodland	Maine
	Kimberly-Clark Corp.	Badger-Globe	Neenah, Wis.
	Bathurst Power & Paper Co.	Bathurst	New Brunswick
GROUP C	Escanaba Paper Co.	Escanaba	Michigan
	Dells Paper & Pulp Co.	Eau Claire	Wisconsin
	Container Corp. of America	Cincinnati	Ohio
	Hoberg Paper & Fibre Co.	Fibre	Green Bay
	Ticonderoga Pulp & Paper Co.	Ticonderoga	New York
	Ontonagon Fibre Corp.	Ontonagon	Michigan
	Consolidated Water Power & Paper Co.	Appleton	Wisconsin
	Cornell Wood Products Co.	Cornell	Wisconsin
	Strathmore Paper Co.	West Springfield	Massachusetts
	Adams Bag Co.	Chagrin Falls	Ohio
	Bemis Bros. Bag Co.	Peoria	Illinois
	Consolidated Water Power & Paper Co.	Biron	Wisconsin
	Strathmore Paper Co.	Woronoco	Massachusetts
	Crystal Tissue Co.	Middletown	Ohio
GROUP D	Mead Corporation	Sylva	North Carolina
	Kimberly-Clark Corp.	Lakeview	Neenah, Wis.
	International Paper Co.	Livermore Falls	Maine
	U. S. Envelope Co.	Morgan Paper Div.	Litits, Pa.
	U. S. Gypsum Co.	No. Kansas City	Missouri
	International Paper Co.	Riley	Maine
	Container Corp. of America	Carthage	Indiana
	Hollingsworth & Whitney Co.	Abenaquis	Madison, Me.

Division II—Remanufacturing

	Container Corp. of America	35th St. Div.	Chicago, Ill.
	Bird & Son, Inc.	Norwood	Massachusetts
	Container Corp. of America	Anderson	Indiana
	Container Corp. of America	Cleveland	Ohio
	Cons. Water Power & Paper Co.	Stevens Point	Wisconsin
	Bird & Son, Inc.	Roofing	Chicago
	Kimberly-Clark Corp.	Atlas	Appleton, Wis.
	Container Corp. of America	Natick	Massachusetts

IMPERFECT SCORES—Division I

	Key	Rank	Points Credit	Points Debit
GROUP A	PA-13	6	816.064	
	PA- 9	7	702.176	
	PA- 4	8	694.784	
	PA- 3	9	647.392	
	PA- 7	10	548.832	
	PA-10	11		1,318.000
	PA- 8	12		16,047.904
GROUP B	PB- 8	11	601.840	
	PB-17	12	510.928	
	PB-16	13	499.536	
	PB-22	14	386.096	
	PB-21	15	337.520	
	PB- 2	16	34.128	
	PB- 3	17		205.200
	PB-13	18		547.776
	PB- 6	19		754.080
	PB-15	20		1,469.360

Division II

	RA-1	9	814.064	
	RB-1	10	380.144	
	RC-3	11		694.176
	RB-2	12		2,908.176

	Key	Rank	Points Credit	Points Debit
GROUP C	PC- 5	15		380.752
	PC- 9	16		666.880
	PC-21	17		876.480
	PC-22	18		1,072.192
	PC- 6	19		1,710.000
	PC- 7	20		4,447.072
	PC-18	21		54,877.264
GROUP D	PD- 5	9	147.984	
	PD-15	10		43.840
	PD-13	11		133.776
	PD- 1	12		1,338.768
	PD-10	13		1,490.800
	PD- 3	14		1,901.584
	PD- 9	15		4,288.688
	PD- 4	16		11,479.664

No July report: PA-5; PB-9; PC-1, 10, 23, 25; PD-6, 7, 11; RD-2.

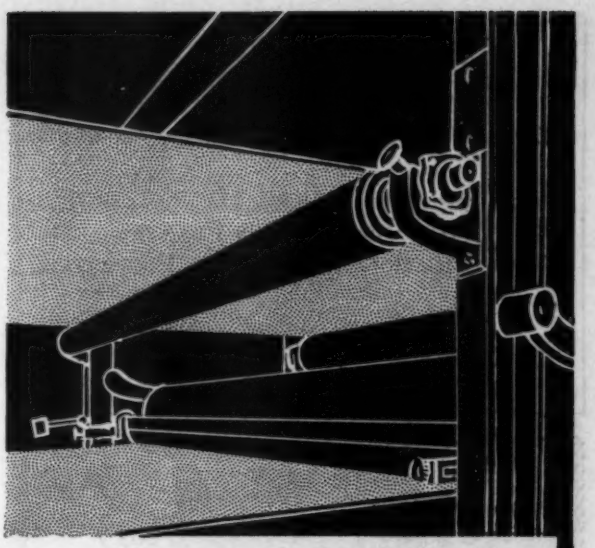
Note.—According to rules of the present contest, mills are now classified according to man-hours worked monthly. Groups are divided as follows:

Group A

◆ Interesting Program for 21st Safety Congress

During the week of October 3 to 7, delegates from a large number of paper and pulp plants will assemble at the Wardman Park and Shoreham Hotels in Washington, D. C., to consider practical, co-operative methods for the promotion of health and the reduction of accidents in the industry.

J. J. Pizak, Consolidated Water Power and Paper Co., is general chairman of the Paper and Pulp Section; Geo. Roller,



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J. Wallace Tower—*Member A.S.C.E. A.S.M.E.*

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POWER PLANTS
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Rhinelander Paper Co., and Arthur Murray, Container Corporation of America, are vice chairmen, and H. D. Banta, Hoberg Paper and Fibre Co., is secretary.

On Tuesday morning, October 4, the program will be opened by Chairman Plzak, who will speak to the Section on "Are We Obtaining Our Objectives?" W. C. Brydges, president of the American Pulp and Paper Mill Superintendents Ass'n will speak on "Lessons Learned from Near Accidents in Paper Mill." Following these papers, officers will be elected, and a question box conducted by G. W. Phillips, safety engineer of the Champion Fibre Co.

The Tuesday afternoon meeting will include talks on "Are We Hitting the Bull's Eye?" by E. E. Grant, chairman, Statistics Committee; "Lessons to be Learned from Paper Mill Fatalities," by H. G. Gilson, safety supervisor, Oxford Paper Co.; and "Dual Control on Guillotine Cutters" by Walter A. Gleason, safety director, Hammermill Paper Co.

For the Thursday morning session, George J. Adams, general supervisor, International Paper Co. and chairman, Nip Hazards Research Committee, will talk on "Nip Hazards—Their Control and Elimination." The discussion will be led by Arthur Murray, insurance manager, Container Corp. of America.

At the Thursday Luncheon Session "Data on the 1931-32 Safety Contest" will be presented by A. Scott Dowd, chairman, Contest Committee. The presentation of the National Safety Council trophies will be made by an officer of the Council, and the award of The Paper Industry Trophy will be presented by E. B. Fritz, publisher, THE PAPER INDUSTRY.

The Thursday afternoon session will include "Participation of Industry in Community Safety" by R. G. Knutson, member, Industrial Commission of Wisconsin; "Special Hazards of Fourdrinier Machines and Their Elimination," by Harry Williamson, general superintendent, Nekoosa-Edwards Paper Co. The "Pro and Con Hour" will be conducted by Arthur E. Winslow, manager of personnel, Hollingsworth & Whitney Co.

◆ Eight New Entrants Participate in Safety Contest

Group winners in the safety contest which closed June 30, 1932, will be announced at the 21st Annual Congress of the National Safety Congress in Washington, D. C., October 3 to 7.

Another contest began July 1, 1932, which will end June 30, 1933. In this contest ninety-three units are entered. Those who have never before competed in the contest are:

Bathurst Power & Paper Co., Bathurst, N. B., Can.
P. H. Glatfelter Co., Spring Grove, Pa.
Individual Drinking Cup Co., Inc., Easton, Pa.
Mead Corporation, Harriman, Div., Harriman, Tenn.
Mead Corporation, Sylva Div., Sylva, N. C.
Mead Corporation, Knoxville Div., Knoxville, Tenn.
Restigouche Company, Ltd., Campbellton, N. B., Can.
Waldorf Paper Products Co., St. Paul, Minn.

According to the rules of the present contest, mills are now classified according to man-hours worked monthly, instead of being grouped by the number of employees as formerly. Groups are divided as follows:

Group A—Mills averaging 110,001 or more man-hours.
Group B—Mills averaging 60,001 to 110,000 man-hours.
Group C—Mills averaging 30,001 to 60,000 man-hours.
Group D—Mills averaging 6,000 to 30,000 man-hours.
All groups in Division II are combined.

◆ Box Board Plants Consolidate

An important event in the paper box industry was recently recorded when six box plants, properties of four midwest paper box board and shipping case manufacturers, were consolidated.

The properties involved in this large merger were: Kieckhefer Container plants at Milwaukee, Wis. and Detroit, Mich.; Eddy Paper Corp. mills at Three Rivers and White Pigeon, Mich.; Quick Service Box Co., Chicago, and Rockford Fiber Container, Rockford, Ill.

The organization resulting from this consolidation has a paid-up capital of $6,500,000 and working capital of $1,500,000.

This merger is known to be one of a series of such movements in the paper box industry; these consolidations looking toward a concentration of production in the lower cost mills.

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IMMEDIATE STEEL FOR MAINTENANCE AND REPAIR

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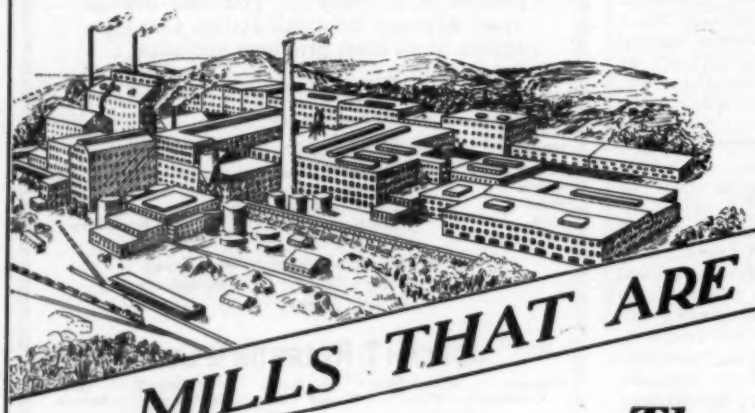

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The Champion Fibre Company

is another of the industry's most progressive organizations that are showing the way to war on waste. They dig deeper than the surface—they get to the cause—the cause of drip and deterioration, of excessive steam cost, of slow uneven drying and similar sources of waste and expense. AIR, properly handled, conditioned and directed by means of ROSS SYSTEMS, is saving dollars daily for these mills. Others are preparing to secure similar savings.

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TECHNICAL DEVELOPMENTS

IN THE PAPER INDUSTRY ■ DOMESTIC AND FOREIGN

The following abstracts are of the latest developments found in the foreign press and in the patent offices. Photostats and translations of complete articles and patents can be obtained at cost price.

◆ Sizing Paper and Cardboard

Attention is called to the difficulties that are encountered in the sizing paper by means of rosin size. The new process overcomes these by fixing the free or combined rosin on the fibers in a special way and by completing the sizing by a supplementary treatment of the paper or cardboard either during its manufacture on the paper machine or after manufacture. The feature of the process consists in causing any of the volatile products forming the solvents of the resinate and of the free rosin fixed on the fibers to act on the paper which has been sized in the usual manner. Such a solvent is trichloroethylene. The resinate and the free rosin on the fibers dissolve in this solvent and form a true solution. This solution is distributed in the paper or cardboard and sizes the fibers to render them absolutely impermeable to all liquids in which the resinate and free rosin are insoluble.

When this treatment is carried out in the papermaking machine, a point in the travel of the paper web is chosen where the latter has lost the greatest part of its water content. The solvent may then be atomized against the paper web as it moves past a series of nozzles or the like. Excess solvent is recovered in a suitable manner.

When the process is carried out after the paper has been made, then the latter is made to pass through a bath of the solvent and then the paper or cardboard is dried and the solvent is recovered. The process may also be carried out on a paper or cardboard which has not been previously sized. In this case the solvent contains either sodium resinate or free rosin in the form of a true solution. Good results are also obtained in this way. The process may be applied to paper made from reworked stock or from wood pulp containing rosin. Antoine C. Gillet. French Patent No. 727,748.

◆ Experiments in Digestion of Resinous Wood

This is a detailed discussion of the mechanism and practical operation of the bisulphite process of digesting resinous woods. It also includes a discussion of the recovery of by-products in the manufacture of pulp by the soda, sulphate and sulphite processes. Important literature is reviewed. The author carried out experiments over three years. Various interesting conclusions were reached, among which the following are significant: Resinous woods, containing ether-alcohol extractable substances from two to five per cent and more, cannot be completely digested by the bisulphite process under ordinary conditions. About one-third of the wood remains undigested. The resins are partly soluble in hydrates of bivalent earth metals. The treatment of woods, containing three to seven per cent substances extractable by ether-alcohol, with hydrates of bivalent earth metals, with weak alkalies or a mixture of both, for a comparatively brief period before digestion, often renders them suitable for digestion by the sulphite process. Treatment with 0.5 to 4-deg. Besodium hydroxide liquor before digestion will effect the same result. The use of organic solvents is uneconomical although effective. Sodium acetate may possibly be economically used for the same purpose. The author indicates how these and other conclusions agree or contradict reports in the trade literature. The technology of the digestion process is described in great detail, including costs. The production of hard pulp and easy-bleaching is covered. Attention is also paid to the production of pulp for making rayon and smokeless powder. The recovery of by-products is studied from the technical and cost standpoints. Carl Bergstroem. Der Papier-Fabrikant, 1932, volume 30, pages 241 to 246 and 255 to 257.

◆ Power Conditions in the Magazine Grinder

This is a detailed mathematical discussion of the power conditions within the pockets of the magazine grinder. Formulae are worked out and the conditions are illustrated graphically in a number of figures. Figure 1 shows just

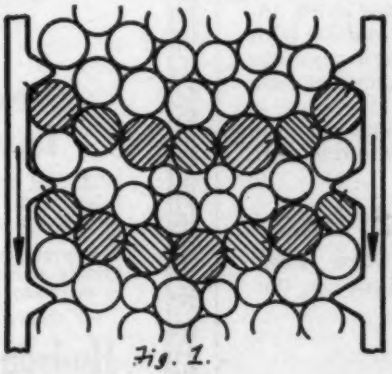


Fig. 1.

what is meant by bridging of the wood within the pocket of the grinder. It is shown that the frequently used "bridging theory" is inadequate and that it leads to false conclusions. For the mass of wood within the pocket attains almost the properties of a solid elastic body, when the pressure is sufficient on all sides. An approximate calculation is carried out, which shows among other things that, when the column of wood is high enough, the wood in the upper part rests against the carrier device and only in the lower part

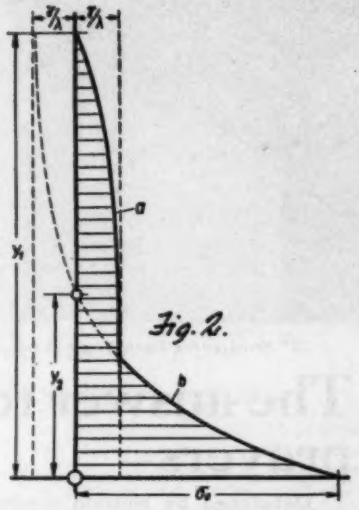
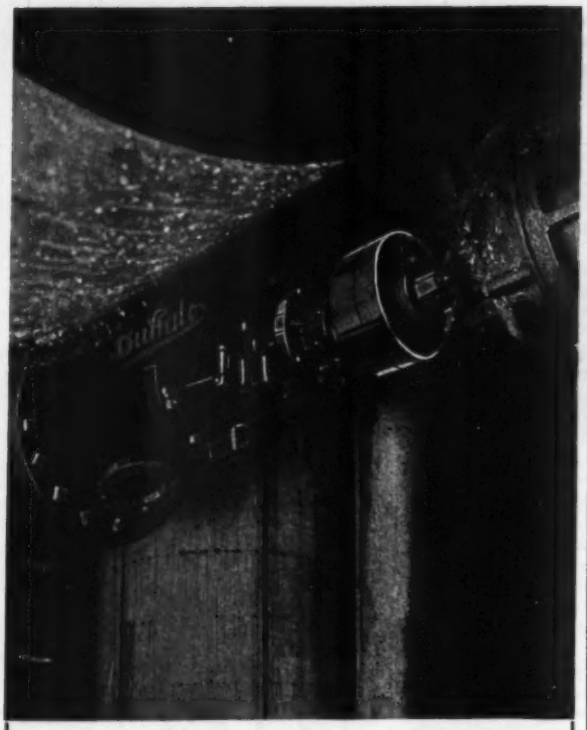


Fig. 2.

against the stone as the pressure increases. This is shown graphically in Figure 2, which represents the distribution of the vertical pressure in the mass of wood, the symbol (y) representing the height above the grindstone. The intersection of the two curves is the point where the pressure changes. The pressure of the wood against the stone begins only below the point of intersection of these curves. Formulae are developed for these curves and numerical examples are worked out. The elasticity theory is also discussed and it is shown how a two-dimensional theory can be obtained. A numerical example is also given. Prof. L. Prandtl. Der Papierfabrikant, 1932, volume 30, pages 313 to 318.

◆ Extraction of Cellulose by Chlorination

Wheat straw and jute (sack cuttings) mainly, flax and cornstalks occasionally, are used as raw materials in the process. The straw cleaned from seeds is cut in a special machine, treated in lye tanks and after pressing is passed to four chlorination towers which work on the countercurrent principle. The straw descends by gravity and chlorine gas is forced through by fans. The treated straw is placed in airtight boxes until all the chlorine has disappeared. It is then washed successively with water,



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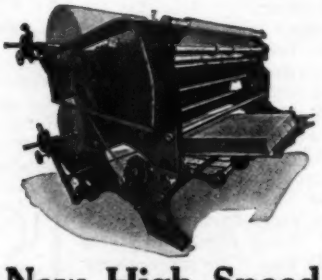

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dilute alkali solution and water again. The process is continuous. The pulp output of the plant is 14 tons of 88 per cent dry content in 24 hours. U. Pomilio. Giornale Chim. Ind. Applicata, 1932, volume 14, pages 161-170.

◆ Sulphite Liquor Circulation

The advantages and principles of various systems of circulating digestion liquor through digesters are studied from the standpoint of irregularity of distribution of temperature through the digester and the degree of digestion of the sulphite pulp. Figure 1 shows how considerably the temperature can vary

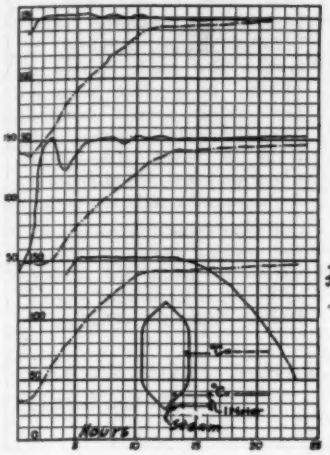


Fig. 1

during the digestion process and also shows the points at which the temperature was measured in the digester. Figure 2 shows the Schauffelberger method of circulating the liquor so that circulation takes place both above and below the screen. In studying the operation of this process the wood chips in the digester are considered cubical in form and regularly arranged one over the other with intervening spaces. It is estimated that a solid meter of wood requires approximately two cubic meters

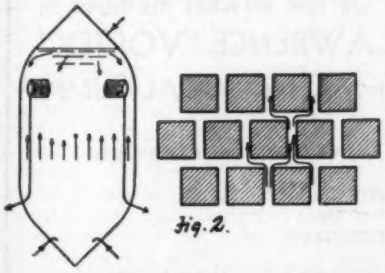


Fig. 2.

of space in the digester. The resistance to circulation in the entire cylindrical digester is approximately equal to 100 mm., the greater part of the resistance being proportional to the square of the speed. Practically the resistance is much greater than calculated. Variation in specific gravity of the liquor causes disturbances in the movement of the same. This disturbance amounts to approximately 10 mm. of water at a temperature differential of 10 deg. C. The path of the circulating liquor is shown in Figure 2.

Various operating conditions of this system of circulating the liquor have been studied, including the consumption of steam in the preheater and the recovery of heat in the condensate used as boiler feed water. The speed of heating is proportional to the difference between the steam temperature in the preheater and the temperature of the liquor before it enters the same. The digestion is carried out by first heating up the liquor to a moderate temperature as quickly as possible, then by maintaining a constant temperature during the progress of the sulfonation process. Thereafter the temperature is brought up to the maximum point as rapidly as possible. The temperature is then maintained constant during the hydrolytic action. The duration of the digestion period depends on the rapidity of heat-

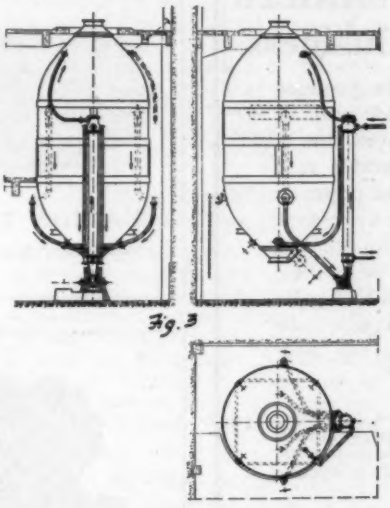


Fig. 3

ing and the final temperature. Conditions controlling the release of pressure within the digester and the sulphur dioxide content of the circulating liquor are also studied.

All the various parts of the apparatus are described in considerable detail and special attention is paid to the materials of construction. Corrosion experiments were also carried out. The various parts of the circulating system must be arranged in such a manner that the strain on the metal is kept as low as possible. A method for testing material under strain is described. Figure 3 shows the construction of the digester, circulating device and preheater. A pair of spiral springs carry the latter. The preheater is very simply designed as shown in Figure 4.

Tests were made on the pulp taken from various points in the digester to show that the quality varies only very little, actually $\pm$ 1 per cent based on consumption of chlorine in bleaching. Furthermore, the quality of each batch of pulp digested is much more limited as the variation of chlorine consumption is only $\pm$ 2.5 per cent in a total consumption of 40 to 45 per cent. It is possible to increase the chlorine consumption to 60 per cent without producing too much degraded cellulose. The ease

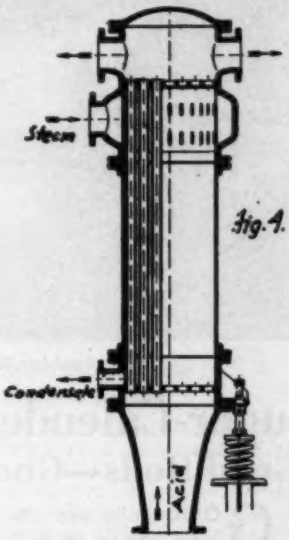
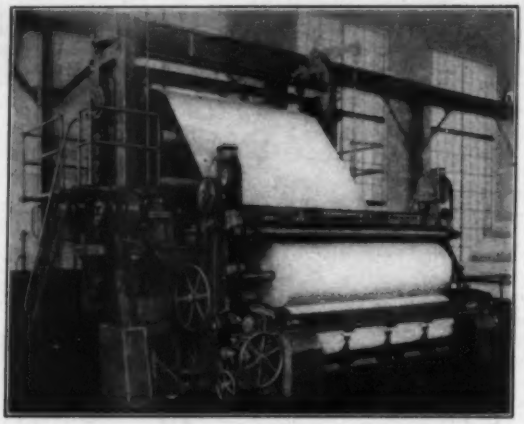


Fig. 4.

of taking samples during the digestion is also cited as particularly advantageous in determining the course of the process. Torsten Samson. Der Papierfabrikant, volume 30, pages 325 to 329 and 341 to 344.

◆ Bleaching Experiments

The effect of acidity on the progress of the bleaching process with sodium hypochlorite is investigated. Bleaching in an alkaline and neutral medium is also studied. The chlorine consumption was the same in all cases. However, the time of bleaching in the acid medium is shorter. The chlorine consumption does not change within the pH limits 4.5 to 6.0, but the duration of bleaching does. Higher acidity affects both factors in considerable degree. The speed of bleaching increases, but so does the consumption of chlorine. The chemical contents of a soft pulp, which has been bleached with an acid sodium hypochlorite bleach liquor, are rather less favorable than those of a pulp bleached with a neutral liquor. Comparative bleaching experiments, which were carried out with chloride of lime liquor and as neutral as possible sodium hypochlorite bleach liquor, showed, that the bleaching required more time in the latter instance due to the higher alkalinity of the bleach liquor. The bleaching effect and the duration of bleaching are, nevertheless, the same with both types of bleaching liquor, provided that the acidity of the liquors is the same. The yields are also only little different. The resin and ash content of the pulp, which has been bleached with sodium hypochlorite bleach liquor, is less than that of the pulp bleached with chloride of lime. Further experimentation substantiated the fact that the bleaching process is affected not so much by the character of the bleaching agent used as by the acidity of the bleach liquor. Ex-



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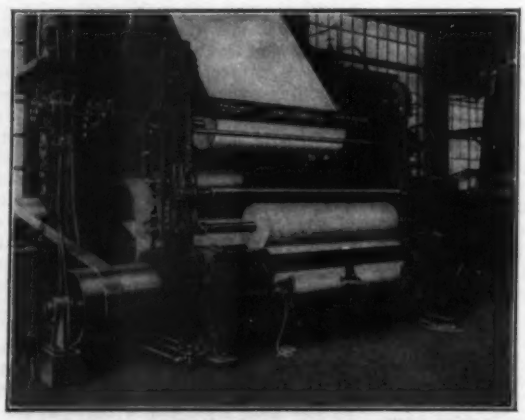

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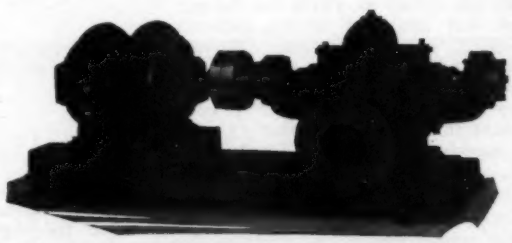

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periments on bleaching in stages with sodium hypochlorite bleach liquor showed, that about 20 per cent of chlorine can be saved by this process. The authors recommend a staged bleaching process (two stages) for high grade pulps when either sodium hypochlorite or chloride of lime liquor is used. The slight increase in the cost of the bleaching operation is fully counterbalanced by the improvement in the quality of the pulp. Fotijew, Majukow and Utkin. Bumaschnaya Promischlennost, volume 10, page 24, number 7.

◆ Bleaching Pulp

Chemical pulp and mechanical wood are bleached while being carried through the bleaching apparatus with the aid of compressed air. The bleach liquor is introduced into the apparatus and the quantity of the liquor is automatically adjusted in accordance with the quantity or the pressure of the compressed air, which is required for transporting the material through the apparatus. The apparatus consists of a charging funnel and of a distributing device for introducing the treated material into the carrier pipe fed with compressed air. The piper, conducting the bleach liquor to the apparatus, opens out within the same funnel. An injector is used for introducing the bleach liquor, air being added to the injector through a pipe, which connects with the compressed air line proper. The suction connection of the injector is connected with a tank, which is provided with a device for the automatic regulation of the height of the level of bleach liquor therein. A regulating cock is built into the suction line of the injector. A valve for controlling the admission of air is also provided. J. M. Voith, St. Poelten. Czechoslovakian Patent No. 37,443.

◆ Reddening of Sulphite Pulp

The reddening of the pulp is determined by dipping pulp or paper strips in a 1.5 per cent hydrogen peroxide solution for 20 seconds, removing and placing on a board for 20 minutes. The deepest color is developed during this time. The room temperature must be about 19 degrees C. There must be no draft in the room. The degree of redness is determined by comparison with standard colors. The reddening of pulp is studied from the standpoints of the influence of the composition of the digestion liquor, of the duration of the digestion and the maximum cooking temperature, of washing the stock, of the color of the waste liquor, of the presence of iron in the digestion acid, of the degree of digestion of the pulp, of the quality of the wood as well as of the alum and/or soda used. It appears that the only positive way in which to avoid reddening of the pulp is to cook the same softer. The only way of preventing reddening in digesting hard sulphite pulp is to add cheap chemicals to paralyze the reddening action. The addition of sodium thiosulphate and sodium hydrosulphite has been recommended. Satisfactory results, however, have not been obtained in this manner. In the future, the research must be directed towards the selection of the proper chemicals to paralyze the reddening action and at the same time not yellowing the pulp. Harry Alfthan, Der Papier Fabrikant, 1932, volume 30, pages 282 to 283.

◆ Regulation of Paper Weight and Thickness

A process and apparatus have been newly devised for regulating the thickness or the weight of paper, paperboard during the process of making the same from paper stock. The thickness of the web is allowed to act on an air space and therewith to affect the resistance of magnetic lines of force. The stock is conducted between a toothed and continuously operating roller made of magnetic material and an electromagnet. The tension, which is induced in the winding of the magnet, acts to regulate the machine that is making the paper or paperboard. The thickness of the web of paper or paperboard is indicated in suitable manner or it may be recorded on a suitable registering device. Leonhard Kehl, Graz-Waltendorf, Austria. Austrian Patent No. 125,516.

◆ Combining Fourdrinier and Cylinder Wire Operations

This is a long continued article describing various methods in which the operation of the fourdrinier paper machine may be combined with that of the cylinder machine in the manufacture of paper and paperboard. A number of duplex and triplex arrangements are described. Some of these have been considered operating secrets for years. The

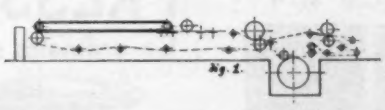
Fig. 1.

simplest and cheapest arrangement is a fourdrinier wire with a lower cylinder wire for making cardboard which is coated on one side. This arrangement is shown in Figure 1. The underlayer (ply) of the cardboard is made on the fourdrinier wire and the top-ply on the cylinder machine. This method may also be reversed. Figure 2 shows the arrangement of a cylinder wire on top

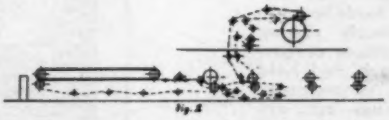
Fig. 2

and a fourdrinier wire on the bottom. It is possible to operate the fourdrinier wire alone or in combination with the cylinder wire in both cases. Figure 3 shows a triplex arrangement with a double fourdrinier wire and a lower cylinder wire. Cardboard finished on both sides is produced by this machine. The weight of the top-ply is 500 grams per square meter, that of the intermediate ply 200 grams, and that of the bottom ply likewise 200 grams. There are six different ways in which the machine can be operated. Other arrangements include two fourdrinier wires running in

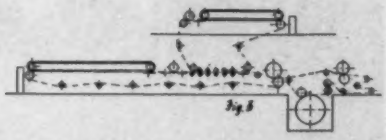
Fig. 3

opposite directions, one over the other, and a bottom cylinder wire, two fourdrinier wires running in the same direction, one over the other, and a top cylinder wire, and one fourdrinier wire running between an upper and a lower cylinder wire. O. Jung. Wochenblatt fuer Papierfabrikation, 1932, 461ff.

◆ Determining Lime in Sulphite Liquor

When the sulphur trioxide content of sulphite liquors is determined by the Schwalbe-Sieber method, without using an atmosphere of carbon dioxide, an error of about 0.01 per cent is obtained. The error in the lime determination by boiling out the sulphur dioxide after the addition of oxalic acid in analyzing the liquor according to the Grappa method to determine calcium sulphite amounts to 0.002 to 0.005 per cent due to the formation of sulphur trioxide. This error is within the limits of accuracy of the determination and may be neglected. The method was tested on various tower liquors and digestion liquors and the results were very accurate and agreed well. An excess of tenth normal solution of oxalic acid was used in the analysis. The precipitate lime was filtered off and the sulphur dioxide determined in the filtrate. The tests included determining the total lime in tower liquor and digestion liquor in the form of the oxalate. The gravimetric results compared well with the titrimetric results. Dr. E. Grappa. Der Papierfabrikant, 1932, volume 30, pages 289 to 290.

◆ Chemical Products From Esparto Grass

The concentrated black liquor, obtained from the digestion of esparto grass with sodium hydroxide, is carbonized after the addition of a mixture of barium and calcium oxides. The product is obtained as a powder. Clear sodium hydroxide liquor of the required specific gravity may be obtained from this powder by boiling with water. Calcination of the residual barium carbonate and calcium carbonate, containing some free carbon, is effected in a revolving kiln. The addition of milk of lime to the sodium hydroxide liquor used in the digestion of esparto causes the precipitation of the silica present in the grass, thus minimizing incrustation on the evaporator tubes and reducing the amount of sodium hydroxide necessary. The calcium silicate is deposited inside the fibers. The products of distillation of esparto black liquor include primary, secondary and tertiary alco-

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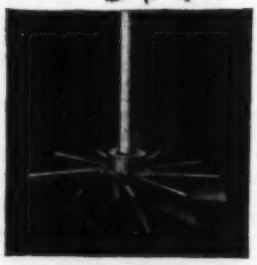

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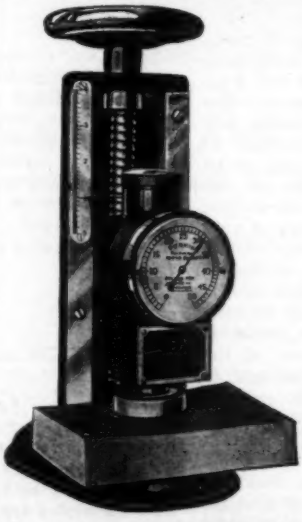

Positive uniform standard for gauging bulk of paper. Simply place the sheets between contact faces and clamp down until desired pressure is indicated on the dial. The exact thickness can then be read from the vertical scale.

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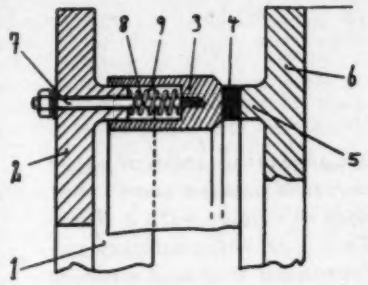
hols, ketones and hydrocarbons. J. MacGregor, Paper Maker, 1932, volume 83, pages 180 to 183 T. S.

◆ Tight Joint Between Cylinder Wire and Wall of Trough

The illustration shows a new method of making a tight joint between the cylinder wire and the wall of the trough in cylinder machines, paperboard and cardboard machines. Connection is made between an annular piece (1) of the wall of the stuff chest (2), and the



corresponding annular part (3), whose frontal surface is provided with a vulcanized fiber part (4) for making tight connection with the cylinder wire (6), through the projecting part (5). The part (3) is arranged with an internally located spring effect which is controlled by the bolt (7). The turning of the bolt, whose threaded end is screwed into the part (3), causes the movement of this part or rather of the vulcanized fiber piece (4) against the projection (5) of the cylinder. This effects a close joint between the wall of the stuff chest and the cylinder. F. H. Riedel, Raschau, Germany. German Patent No. 543,260.

◆ Removing Moisture From Paper Webs

Superheated steam is directed obliquely against the surface of the moving paper web in the paper machine. An atomized flow of steam is used. Perforated outlet pipes are arranged either above or below the paper web, or both above and below. These pipes are placed rather close to the web, so that the full blast of superheated steam hits the web. Suitable regulation is provided. The superheated steam, which is impacted with comparatively great velocity against the paper web, is able to remove large quantities of moisture. The precipitated moisture and the condensed steam may be collected and conducted away either to a collecting tank for hot water or to any other suitable point for feeding into the boilers. Edward E. Tasker. German Patent No. 540,498.

◆ Analyzing Sulphite Digestion Liquors

Disagreements in the determination of free sulphur dioxide in the liquor are due to the partial volatilization of sulphur dioxide and to partial oxidation to sulphuric acid. The difficulty of obtaining a sharp color change in the indicator is due to the carbon dioxide and organic acids contained in the liquor. Best results are obtained with bromophenol blue as indicator. The difficulties are overcome when an oxidizing agent is previously added to the liquor. This chemical must be neutral to all indicators. Hydrogen peroxide is used. This immediately oxidizes all the sulphur dioxide to sulphuric acid. This method is tested for applicability under different conditions. Numerous results are given. The method is proven to be accurate in the analysis of tower liquors, digestion liquors strengthened by dissolving waste sulphur dioxide in them and the like. William Steuer. Der Papier-Fabrikant, 1932, volume 30, pages 253 to 254.

◆ Concentrated or Liquid Sulphur Dioxide

Concentrated or liquid sulphur dioxide is made from gaseous mixtures containing sulphur dioxide by absorbing the latter under pressure in a liquid and then driving out the gas by reducing the pressure or heating or by both. The conditions of absorption, particularly the pressure and the temperature, are such, that the ratio of the per cent by volume of sulphur dioxide content in the gaseous mixture to the per cent by weight of the sulphur dioxide absorbed in the liquid is as 3 to 2. Hence, when the gaseous mixture contains 18 per cent by volume of sulphur dioxide, a sulphurous acid solution will be obtained, which contains a minimum of 12 grams of sulphur dioxide per 100 grams of solution. The gaseous mixture is compressed in two or more stages with the intervention of a cooling step between the stages. A./S. Malmindustri, Oslo, Norway. Finnish Patent No. 13,689.

◆ Pulp Beater

The beating action of the beater roll in the pulp beater should be to disintegrate the pulp to the proper degree without however injuring the cellulose fibers. This is accomplished by the new

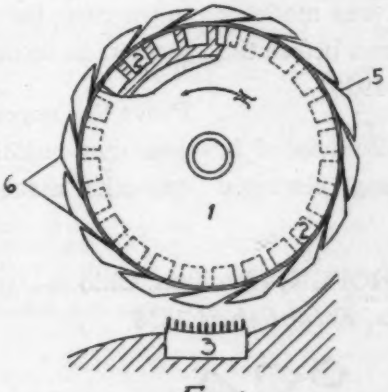


Fig. 1.

form of beater roll shown in the accompanying illustrations. The beater roll (1) carries the usual slots (2) on the surface which serve to carry the stock and bring it into contact with the bedplate (3). T-shaped collars (4) are mounted on the periphery of the roll. The teeth (5) are fastened to these collars and these teeth are arranged tangentially to the surface of the beater

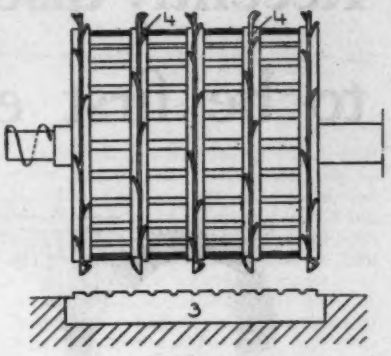


Fig. 2.

roll. The beater roll is arranged at a certain distance over the bedplate and rotates in the direction shown by the arrow. The curved teeth on the beater roll have a gentle action on the wood fibers. Henry S. Wahlberg, Sweden. French Patent No. 726,697.

◆ Regulating and Measuring Pressure in Beaters

The regulation and measurement of the pressure in pulp beaters is effected by means of a weighing device which is actuated by movable beater roll bearings. The balance beams, which are arranged on the two sides of the beater at both ends of the beater roll shaft, consist of a lever with two arms. They are journalled rotatably in a single support which is located near the center of the beater roll. One of the arms carries a bearing of the beater roll, while a balance spring is connected to the other arm. This spring is adjustable in tension and is provided with a suitable indicating device. J. M. Voith, St. Poelten, Austria. Austrian Patent No. 125,512.

◆ ◆ ◆

◆ New Process for Bleaching Groundwood

After three years of experimentation in laboratory and mill with the bleaching effect of various chemical reducing agents on groundwood, a practical and efficient process which is said to be a distinct improvement over previous methods, has been evolved by the Great Western Electro-Chemical Co.

The process is already established as standard practice in several Pacific Coast and Canadian mills. U. S. Patent No. 1,873,924 and Canadian Patent No. 307,440 have been granted to Great Western Electro-Chemical Co., discoverer of the Hydrosulphite Process.

For newsprint, book papers, fruit wrap and kraft it is claimed that the Hydrosulphite Process is producing a whiter sheet even from Western Hemlock, or dark and discolored woods, than has heretofore been possible with any other bleaching agent.

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The COMMERCIAL OUTLOOK

New York, September 1, 1932.

THERE are concrete evidences that activity in the paper industry is on the increase. The pronounced improvement in security prices and trading, distinct gains in the textile and certain other manufacturing industries, the marked change for the better in business sentiment, and signs that the industrial and financial structure of the country is on the mend following the worst period of depression ever experienced certainly by the present generation, is being reflected in the paper industry. Reports are coming in thick and fast of paper and board mills speeding up production as a result of the receipt of larger and more orders, of some plants which have ben closed down reopening, and of others encountering a sufficient demand for their products to justify operations at near to maximum capacity. Moreover, the price condition in paper is steadying, if not firming; there have been no actual increases of any consequence as yet, but manufacturers are commencing to assume a stronger view regarding prices and there isn't the pressure for orders that has been so significant a feature of the market until very lately.

Further, sentiment is not only confident, it is becoming of bullish mien. On all sides are heard expressions of opinion that after the Labor Day holiday and the unofficial ending of summer, demand for paper of various kinds will show considerable expansion; that consumers, jobbers and converters will enter the market to replenish depleted stocks as well as purchase supplies against increasing definite requirements. In short, the belief exists within the paper industry that the depression has at last reached an end, that the upswing in securities and the upturn in some commodities and broadening activity in certain lines of manufacture and trade is not simply a momentary spurt, but actually constitutes the beginning of a return to more normal business conditions and a revival in trade generally.

Paper manufacturers and distributors agree that consuming customers are adopting a changed attitude toward purchases, and are placing orders with far greater freedom than in a lengthy while. Some paper mills have secured a large volume of business during the last several weeks. Buying started suddenly and with a rush, and has gained momentum day by day. The old fear that the market might advance to their disadvantage appears to have gripped consumers and converters, and they have entered the picture as buyers on an appreciably larger scale than has characterized their operations in months.

Production of paper in the United States during the first six months of this year was approximately 13 per cent below the level of the corresponding period of last year, and inventories of producing mills were 3 per cent smaller than a year ago, according to identical mill reports to the American Paper and Pulp Association. All major grades showed decreases in output this year. Production was in fairly close balance with demand in most grades as evidenced by the fact that almost all stocks were below last year's level. The total output in the first half of this year reached 2,364,113 net tons, against 2,705,664 tons in the same time of 1931, while shipments from mills aggregated 2,363,531 tons, compared with 2,703,533 tons last year, and stocks at mills at the end of June last amounted to 264,259 tons, contrasted with 272,298 tons on the same date a year ago.

During the first half of 1932, manufacture in both the so-called cultural and mechanical grades of paper was below the corresponding 1931 records; the mechanical grades such as board, wrapping, etc., however, sliding off at a faster rate. This is contrary to the usual order because the mechanical grades are ordinarily more stable. The decrease in the cultural grades reflected the continued but now more gradual decline in advertising and printing.

Newsprint production dropped to a new low point for the current movement in July, when mills in the United States and Canada turned out a total of 216,993 net tons, and shipped 222,288 tons, compared with 246,767 tons produced and 248,565 tons shipped in the preceding month, according to the News Print Service Bureau. United States output in July amounted to 74,502 tons and shipments to 76,857 tons, while Canadian production was 142,491 tons and shipments 145,431 tons. During the month, 24,528 tons of newsprint were manufactured in Newfoundland and 1,082 tons in Mexico, so that the total North American output for July amounted to 242,603 tons. The Canadian mills produced 192,936 tons less newsprint in the first seven months of 1932 than in the same time last year, which was a decrease of 14 per cent. The output in the United States was 71,923 tons or 10 per cent less than in the first seven months of 1931, in Newfoundland 7,346 tons or 4 per cent less, and in Mexico 1,768 tons less, making a North American decrease of 273,973 tons or 12 per cent. Stocks of newsprint at United States mills at the end of July were 33,369 tons, and at Canadian plants 47,017 tons, giving a combined total of 80,386 tons, compared with 85,681 tons on June 30 last. The total output of newsprint in this country and Canada in the first seven months of this year was smaller than in any like period since 1925, when 1,753,488 tons were produced in the same period.

Paperboard production in the United States aggregated 171,277 net tons in June, registering a slight gain over the 170,191 tons in the preceding month but a sharp decline from the 224,110 tons produced in the similar month of 1931, according to the monthly summary of the board industry compiled by the U. S. Department of Commerce. Total board output in the first half of this year reached 1,095,231 tons, against 1,330,154 tons in the corresponding time of 1931, and 1,390,406 tons in the first half of 1930. New orders for board received by manufacturers during June called for 166,140 tons, against 166,219 tons in the preceding month, and unfilled orders held by mills at the end of June were for 29,802 tons, compared with 31,401 tons a month earlier. Shipments of board from mills in June totaled 167,739 tons, against 167,425 tons in May last, and stocks at mills at the end of June amounted to 84,674 tons, contrasted with 81,136 tons at close of preceding month.

There is general expectation that takings of newsprint by publishers will increase in September as the national political campaign gets well under way and as department stores and other retail merchants begin to drum up autumn business. Demand for book paper has broadened substantially, so much so that some book paper mills have found it necessary to increase their production appreciably. Wrapping is in fair call, with the price condition still bordering onto the chaotic. Business in fine papers is improving, and tissue, greaseproof, glassine, and the many lines of fancy papers for box-covering and other purposes are showing more market activity. Boxboards are in better demand and there are rumors of an impending price rise by mills in the East.

◆ ◆ ◆

◆ E. VICTOR DONALDSON, president of Robert Gair Co., Inc., New York City, has announced that the fibre board business of the Bogota Paper & Board Company, and the fibre shipping case business of his company will hereafter be continued through a subsidiary of Robert Gair Co., Inc. The subsidiary will be known as the Bogota Paper & Board Corp., and will be under the management of F. G. Becker, president, and Harold S. Smith, vice-president.

◆ THE FALK CORPORATION, Milwaukee, announces the appointment of L. A. Graham and M. A. Carpenter as sales manager and sales promotion manager, respectively, for all commercial products of this company. Foundry sales remain under the direction of A. Simonson, vice president.

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Domestic RAW MATERIALS

◆ Papermaking Rags

Reports from various quarters tell of paper manufacturers evincing more interest in rag stock. It is true that purchasing is still along restricted lines, that consumers with few exceptions are absorbing only such supplies as they need, but the upturn in raw materials generally, coupled with the fact that most paper mills are in need of larger amounts of rags, are factors leading to a somewhat livelier market and to a moderate demand for certain classes of papermaking rags. Dealers and importers tell of mill customers placing orders with greater freedom than was their wont until very recently, of the commitments received calling for at least slightly larger quantities of rags, and of manufacturers meeting prices which represent just a little strengthening from the levels prevailing prior to the upturn in the market.

The rag situation presents something of puzzling character. Dealers are insistent in their contention that the market is suprisingly bare of sizeable accumulations of rags, and argue rather forcibly that any appreciable expansion of demand would cause a rather sharp rise in prices. The basis for this condition, it is asserted, is the very low production of many kinds of rags, the greatly curtailed collections of old rags, and the sharp decrease in imports from foreign sources into the United States for months past. The collection machinery of the country, it is declared, has been badly disorganized, with the result only a small percentage of the normal supply of old rags is being gathered and made available in the market; also, in the case of new cotton and linen cuttings, it is said production in clothing factories has been reduced to a bare minimum. Moreover, dealers emphasize that present market prices necessitate them operating at a decided loss, and argue that paper manufacturers can hardly expect suppliers to provide rags at such prices, particularly should the requirements of mills increase to a point where larger tonnages would have to be secured. On the other hand, papermakers seem to feel that consumption of and demand for rags has been so limited for so long a while that it is but logical to believe substantial lots of stock are available here, there or somewhere awaiting buyers, and that it would probably require a good deal of mill buying to remove surplus holdings of dealers and put the market in a position where any important rise in prices would likely occur.

There have been reports of sales of No. 1 new white shirt cuttings to paper mills at 3.50 cents a pound delivered, though it can be said dealers with rare exception are asking well in excess of this price, or at least 4 cents for these rags. New fancy shirt cuttings and No. 1 washables have stiffened in value to about 1.25 to 1.50 cents a pound f.o.b. shipping points, while new unbleached muslins, new blue overall cuttings, light silesias and khaki cuttings are moving in better fashion and at steadier prices. Old white cottons and blue cottons tend firmer in value although no actual price changes have as yet been recorded. Roofing rags are a shade higher on a basis in the East of around 45 cents per hundred pounds for No. 1 packing and 35 cents for No. 2 stock f.o.b. New York.

◆ Rope and Bagging

Prices of old rope are holding their own even though paper mills claim to have ample stocks on hand and are adding to their supplies only in a strict routine way. Domestic No. 1 old manila rope is selling at about 1.50 cents per pound to perhaps a little higher in some cases f. o. b. dealers' points, while foreign old manila rope is bringing 1.40 to 1.50 cents ex dock American Atlantic ports. Bagging is in better demand, and it would seem that short supplies are serving to stiffen market prices. No. 1 scrap burlap is reported fetching in the vicinity of 70 cents per hundred pounds at shipping points, and roofing bagging is about 30 cents a hundred f.o.b. dealers' points.

◆ Old Paper

Most descriptions of waste paper are coming in for a little more attention on the part of board and paper mill consumers. Manufacturers are not keen buyers, which is to say they are evidently doing little anticipating but simply covering requirements as they develop, yet there seems no question but demand has broadened and the slight spurt of mill purchasing has caused some stiffening of prices. Book stock has advanced to a level of 50 to 55 cents per hundred pounds for No. 1 flat stock f. o. b. shipping points in the East, and higher prices than this prevail in the Middle West. Old kraft paper is up to 75 cents for No. 1 packing at dealers' points, and white shavings in some instances are quotably stronger at around 1.40 cents a pound for No. 1 soft white shavings and 1.60 cents for No. 1 hard white at shipping points with above these figures demanded by packers of extra quality shavings. Folded news is firm at 25 cents a hundred pounds in the East, and No. 1 mixed paper is selling at 12½ to 15 cents and up to 20 cents for repacked grade f.o.b. New York, with beyond these prices obtained by sellers in the Middle West.

◆ Pulpwood

The market for pulpwood exhibits signs of improvement though changes of concrete character are lacking. During July, Canada exported 82,344 cords of pulpwood, valued at $717,969, all to the United States, against 50,674 cords of a value of $477,601 in June this year, and 117,842 cords of a value of $1,189,170 in July last year.

◆ Mechanical Pulp

Not much demand is reported for mechanical pulp other than on contract, and the few buyers in evidence appear to be satisfying their wants through purchases at their own prices so long as they make bids within reason. Some Canadian groundwood has been bought down to $15 per ton f.o.b. pulp mills across the border although grinders in the Dominion mostly are endeavoring to secure $17 to $18, prices of course depending on the haul to consuming centers and the air dry test. Very little domestic groundwood is being sold in the open market and prices are mainly nominal at approximately $20 a ton at producing points. The American Paper and Pulp Association reports 60,094 tons of mechanical pulp produced in the United States in June, 62,562 tons used by producing companies and 1,437 tons shipped out to other consumers, with stocks on hand at producing plants at the end of June amounting to 67,542 tons.

◆ Chemical Pulp

It is quite apparent that domestic pulp manufacturers are exerting every effort to sustain market prices of their product, even to the degree of turning down orders which they find available at prices below recognized market levels. Demand from consuming quarters is restricted; there is, of course, a steady movement of supplies against contracts and back commitments, but new buying has been of narrow compass recently and consumers candidly state they do not intend to increase their orders until their requirements fully justify them absorbing larger amounts of pulp. Domestic producers are quoting 2.10 cents a pound on bleached sulphite on an Atlantic seaboard basis, while unbleached sulphite of prime grade is about 1.60 cents f.o.b. pulp mills, and domestic kraft pulp is anywhere from 1.60 to 2 cents per pound at manufacturing points, depending on quality as well as the freight to consuming centers. Bleached soda pulp is maintained at 2.25 cents a pound delivered book paper mills, with the several foremost producers adhering firmly to this price.

Production of all grades of wood pulp in the United States in the first half of this year totaled 956,373 tons, compared with 1,107,029 tons in identical mills in the same time of 1931, a decrease of 14 per cent, according to the American Paper and Pulp Association. Mill stocks at the end of June last amounted to 88,885 tons, against 94,345 tons on the similar date a year ago.

◆ Chemicals

At least some chemicals for pulp and papermaking are showing a hardening price tendency and are reported moving in rather larger volume. However, the market has registered little definite change while awaiting a better call for supplies from consuming quarters.

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PAPER

Import and Export MARKETS

IMPORTS

◆ Wood Pulp

The prime development in the foreign wood pulp situation is the termination of the strike in Sweden, which ended on August 9 when the warring factions reached a compromise agreement. Information since received is that a wage reduction of something like 7 per cent was put into effect, while the mill owners granted some of the demands relating to working hours, etc., which the strikers held out for.

The return of the Swedish industry to production puts a rather different light on the world wood pulp situation. True enough, the shutdown of the pulp mills in Sweden of four months' duration meant the loss of a big tonnage of pulp, estimated from authoritative quarters at 310,000 tons of sulphite—bleached and unbleached, though mostly the latter—190,000 tons of sulphate or kraft pulp, and 125,000 tons of groundwood, or a total of 625,000 tons of all grades of pulp. This loss of production will not, of course, be made up except perhaps in small part, but the fact remains that even with the Swedish industry shut down, the pulp market the world over was in the doldrums with prices weak and with the enormous loss in output in Scandinavia seemingly exerting very little or no influence.

Everything, it would appear, now depends on the development of demand for pulp from consuming quarters. If the paper industry registers improvement and paper mills are speeded up to a point where they consume more nearly normal amounts of pulp, the market should not only become firmer but should record some price advancement, as it is the contention of those on the selling side of the market that prevailing prices allow producers little or no profit above the cost of manufacturing pulp. On the other hand, unless world consumption increases—and fairly appreciably — the return of the big Swedish tonnage to the market probably will lead to additional easiness in prices. However, a majority in the trade believe that Swedish manufacturers will not proceed promiscuously to produce pulp at prevailing market values but will keep their output within the scope of the market's requirements, and thus preclude any piling up of surplus stocks.

Meanwhile demand for imported pulp in the United States is not brisk, nor is it dull. There is a moderate volume of buying by American paper manufacturers, and importations against contracts and back orders are arriving with consistent regularity. There has been some effort to re-sell in the market here but this has largely ceased since the paper market gave signs of reviving in recent weeks. Prices as quoted are well maintained and seem quite stable, although it is no secret that some transactions have been engineered at slight concessions. The basic prices of 2.10 cents a pound on bleached sulphite of prime quality for shipment from abroad ex dock American Atlantic ports, 1.60 cents on prime unbleached sulphite and 1.50 cents on prime kraft pulp continue in effect, and on behalf of a big majority of producers and shippers in Europe it should be said they are refusing to shade these rates, though there are cases where purchases have been made at a dollar or two per ton less. Imported groundwood of Scandinavian origin is quoted at $18 to $19 per short ton ex dock New York or other American Atlantic ports.

Imports of pulp into the United States in June showed an increase over the previous two months but were still on a comparatively small scale, according to official U. S. Department of Commerce statistics. June receipts of chemical pulp totaled 64,011 long tons, valued at $2,433,032, compared with 59,424 tons of a value of $2,348,666 in the preceding month and 101,745 tons of a value of $4,643,281 in June, 1931. The June imports brought the total for the first six months of this year up to 589,649 long tons, giving a monthly average of 98,274 tons, and just exceeding the importations in the corresponding period of last year amounting to 562,197 tons, for a monthly average of 93,699 tons. Groundwood imports in June were 12,651 long tons, valued at $312,032, making a total of 80,098 long tons of a value of $1,676,533 in the first half of this year, against 84,108 tons of a declared value of $2,134,510 in the similar time of 1931.

◆ Paper Stock

Imports of rags for papermaking remain on a small scale, latest issued figures of the U. S. Department of Commerce putting the total for the first six months of 1932 at 45,458,873 pounds, valued at $596,950, representing a decline of 30 per cent from the 62,342,206 pounds of a declared value of $849,773 imported in the corresponding period of 1931. Obviously, with demand here from paper mills of narrow compass, and with market prices ruling abroad said to be proportionately higher than those obtainable here, importers are bringing in few rags. Imports of all other paper stock during the first half of this year amounted to 49,982,380 pounds, valued at $423,093, contrasted with 57,691,829 pounds of a value of $897,658 in the same period a year ago.

◆ Paper

Imports of paper and paper products into the United States in the first six months of the current year were valued at $50,768,028, representing decreases of 23 per cent and 15 per cent respectively when compared with $66,095,703 worth of imports in the first six months of 1931, and the preceding six months. Imports of newsprint were valued at $45,200,333, against $58,336,155 in the corresponding period last year. Cigarette paper imports were also comparatively low, falling over three-quarters of a million dollars short by a like comparison. The only individual increases were of kraft wrapping paper, and of leather board, test and wall board.

EXPORTS

Exports of paper and paper products from the United States during the first half of 1932 were valued at $8,534,099, according to official U. S. Department of Commerce figures, a decrease of 17 per cent from the preceding six months, and 30 per cent from the $12,125,865 for the corresponding six months of 1931. In comparison with the 1931 first half-year, shipments of greaseproof and waterproof papers showed a loss of 15 per cent in quantity and a gain of 2 per cent in value; those of overissue newspapers, an increase of 17 per cent, both in quantity and value; and those of surface coated papers, gains of 17 per cent in quantity and 12 per cent in value. All other exports of paper and paper products declined both in quantity and value, tissue and crepe papers and vulcanized fibre sheets, strips and tubes suffering least. The heaviest decline was recorded in hanging paper, which showed a loss of 72 per cent. This significant decrease was closely paralleled by the declines registered in wall board of paper or pulp, blotting paper, and sheathing and building paper, while in the group which suffered losses from 45 to 50 per cent were included cover paper, paper towels and napkins, other paper board and fibre insulating lath or board. Items which were from 35 to 40 per cent below last year's figures included boxboard, bristols and bristol board, envelopes, paper bags, and fancy writing papers, while exports of newsprint, cash register and book paper, not coated, were each 27 per cent below, a notable feature of the last-mentioned being an increase of 60 per cent to China and 38 per cent to New Zealand. More moderate decreases occurred in toilet paper, filing folders, index cards,

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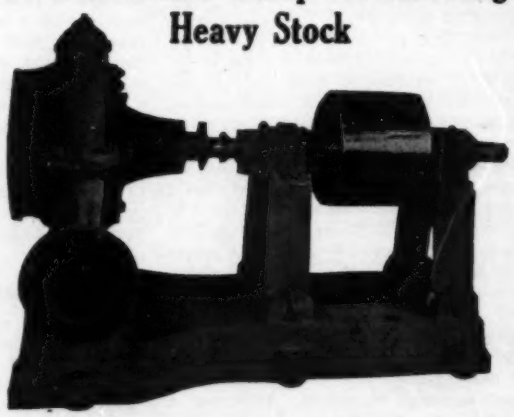

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Exports of paper base stocks were valued at $1,536,774 during the first half of the current year, a decrease from the $1,609,449 in the same period of 1931. Those of sulphite wood pulp, which accounted for $1,082,158 of the total exports in this group, showed a gain of 22 per cent over the first six months of last year. "Other wood pulp" exports continued to decline heavily, registering a decrease of 76 per cent, while those of pulpwood fell to less than half of last year's figure for the first six months. Exports of soda pulp, rags and other paper base stocks suffered decreases less than 30 per cent.

❖ ❖ ❖

◆ Import Committee Files Complaint on Dumping

The Import Committee of the American Paper Industry has started formal action involving foreign M. G. Sulphite wrapping paper by filing complaint of suspected dumping. Similar action is to be taken on foreign kraft wrapping, and is under consideration as to German vegetable parchment.

The United States Customs Court has rendered a decision whereby fourteen importations of embossed or coated boards of the general trunk board type are held dutiable at 30 per cent instead of 10 per cent as claimed by the importers.

Customs officials have held sunburst and embossed cover papers dutiable as decorated papers at higher rates than the 30 per cent provided for plain cover paper. An importation of M. G. Sulphite at Houston has been held by Customs officials to have been undervalued.

Cases involving paper estimated by Warren B. Bullock, manager of the Import Committee, to be worth about $40,000 have been abandoned in the Customs Courts by the importers after protest had been carried to the court from the action of Customs officials. Among the cases were fifteen of writing paper and envelopes, seventeen of fancy box cover paper, and four on Canadian paper claimed to be standard newsprint but held to be dutiable as novel or tablet news.

◆ NINE CARLOADS of special paper, watermarked with the emblem of A Century of Progress, have been ordered for the printing of World's Fair Certificates which have just been approved by the Exposition management. These certificates will be sold to merchants who will use them to stimulate trade by offering them as premiums with purchases. The Continental-Illinois Bank and Trust Co., Chicago, has been appointed as trustee to safeguard the funds received from the sale of these certificates.

◆ KNUT J. LUNDAHL, formerly personal representative of the Swedish Pulp Co. in New York, has recently been appointed sales manager for the United States Division in Stockholm, where he will reside.

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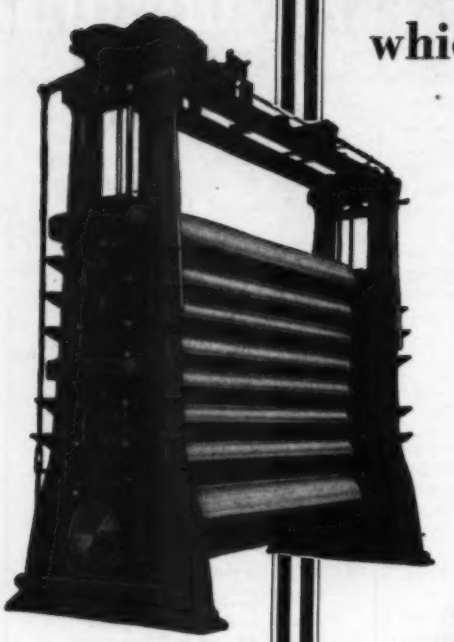

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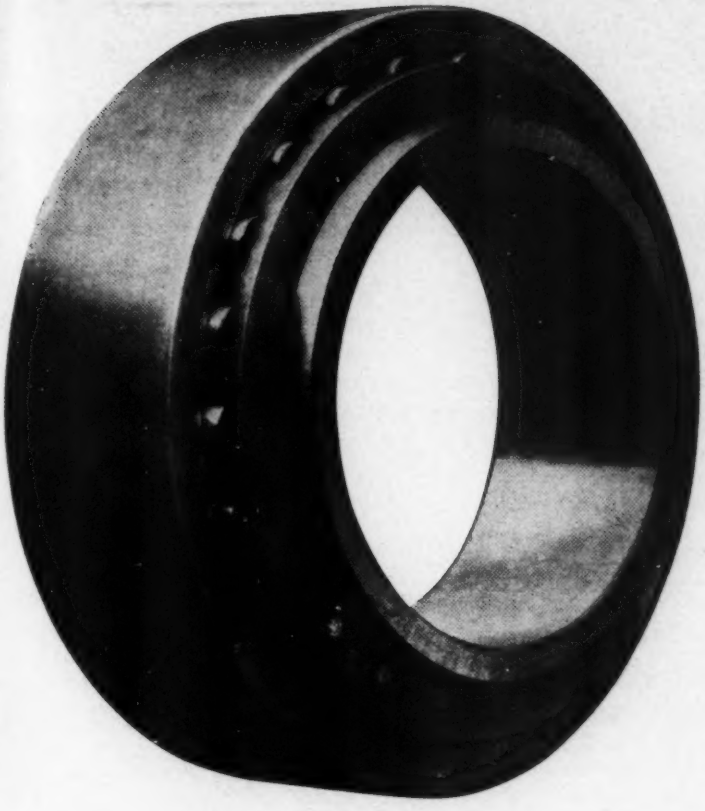

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